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Working Paper 32864
http://www.nber.org/papers/w32864

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 2024, Revised July 2026

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305A200060 to NBER. The opinions expressed are those of the author and do not represent views of the Institute or of the U.S. Department o f Education. The Boston Foundation, The Spencer Foundation, and The Russell Sage Foundation also provided generous financial support. Many thanks to Sara Xi, Savannah Kochinke and Elizabeth Pancotti for providing superb research assistance. I am grateful to Josh Angrist, Parag Pathak, Chris Avery, Kevin Lang, Doug Harris, Sarah Cohodes, and Matthew Gudgeon for helpful comments and to seminar participants at NBER Education, Brandeis University, Tufts University, and the Institute for Education Sciences Principal Investigators Meeting for feedback. Special thanks to the staff of the Massachusetts Department of Elementary and Secondary Education and METCO for sharing data, expertise, and feedback. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

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JEL No. I20, I21, I23, I24

ABSTRACT

School assignment policies are a key lever for expanding access to high-performing schools and promoting racial and socioeconomic integration. For over 50 years, the Metropolitan Council for Educational Opportunity (METCO) has bussed students of color from Boston, Massachusetts to relatively wealthier and predominantly White suburbs. I estimate the effects of attending a high-performing suburban school by comparing applicants who receive enrollment offers with applicants who do not. A two-stage least squares approach exploits waitlist assignment priorities and controls for a rich set of characteristics from birth records and application data. Attending a suburban school boosts math and English test scores, reduces dropout, and increases on-time high school graduation. Four-year college aspirations, enrollment, and graduation increase along with earnings in adulthood. Students whose parents did not attend college and boys experience the largest effects. The evidence points to several mechanisms, including access to higher value-added schools, higher achieving peers, and schools with stronger college-going norms. Participants are more likely to be tracked into lower performing classes, implying that effects could be larger with access to more advanced coursework. District value-added estimates suggest that students' educational trajectories shift at least as much as they would from growing up in the suburban districts.

Elizabeth Setren
Tufts University
Department of Economics
and NBER
elizabeth.setren@tufts.edu

A data appendix is available at http://www.nber.org/data-appendix/w32864

De facto socioeconomic and racial segregation persist in U.S. neighborhoods and schools. School segregation has increased following Supreme Court rulings that restricted inter-district school integration and the use of race in school assignment.[2] Segregation is linked with disparities in access to advanced coursework, resources, and outcomes. To increase equity, access to opportunity, and integration, districts use school assignment and school choice policies. In 2019, forty-six states and the District of Columbia had at least one intra or inter-district school choice program and more than 14 percent of public school students attended schools with active integration programs (Potter and Burris, 2020).

One of the largest and longest-running school integration programs in the country, the Metropolitan Council for Educational Opportunity (METCO), has bussed students of color from Boston, Massachusetts to more than 33 predominantly White and relatively affluent suburban school districts since 1966. METCO is voluntary for urban applicants and for suburban districts, which joined in the program's first decade. METCO gives students access to suburban public schools with substantially higher graduation rates, college-going rates, advanced courses, and test scores. The program is popular: over the past 20 years, 50 percent of Black youth and 20 percent of Latinx youth in Boston applied. Due to its longstanding legacy, METCO serves as a model for other integration and choice programs and plays a leading role in national school integration organizations, including the National Coalition on School Diversity and the Bridges Collaborative.

Despite access to higher-performing schools and peers, METCO also introduces challenges that could hinder participants' academic outcomes. Longer commutes may reduce study time, inhibit participation in extracurricular activities, hinder parent engagement, and limit peer interactions. Students may face bullying and discrimination that affects course placement, teacher expectations, and disciplinary outcomes. These potential drawbacks make the net academic effects of enrolling in suburban schools unclear.

This paper estimates the effect of attending a high-performing suburban school on the academic out-

[2]See *Milliken v. Bradley (1974), Parents Involved in the Community Schools v. Seattle School District No. 1* (2007), and *Meredith v. Jefferson Co. Board of Ed* (2007).

comes of students of color in Boston, Massachusetts. METCO applicants may differ from the average Boston student in unobserved ways, including parental engagement and expectations. Focusing on families that applied to the program helps account for unobservable characteristics that led families to apply. I collected and digitized 56 years of detailed application records. The analysis focuses on applicants who first enrolled in school between 1990 and 2019.

I estimate the effect of participating in METCO by using offers to enroll in suburban districts as instrumental variables and controlling for approximate waitlist position using age at the time of application, gender, and race indicators. The estimates compare the outcomes of those who participate in METCO to observationally similar applicants who applied at similar times but were not given offers.

I find large positive effects on academic achievement. Students score up to 0.13 standard deviations higher in math in grades 3 through 10 and 0.14–0.21 standard deviations higher in English. METCO participation increases school attendance by three to nine days a year despite the longer distances and fewer public transit options. Suspension rates fall by more than half for grades 3–9. METCO increases SAT taking and scores, but lowers AP exam taking. The program increases on-time high school graduation by 18 percentage points and reduces the dropout rate by more than half. METCO increases four-year college aspirations by 18 percentage points, enrollment by 22 percentage points, and graduation by 13 percentage points. Earnings at age 35 increase by approximately $16,250.

METCO also leads to changes that could negatively impact students' outcomes. Participants have less exposure to teachers of color. Gershenson et al. (2022) find improved educational achievement for Black students who have at least one Black teacher. METCO participation results in changes to special education classification, which has an unclear impact on student outcomes. Students in METCO are more likely to be classified as special education and receive special education services in an inclusive setting, but less likely to receive special education services in a separate classroom. Participants attend schools with more AP class options, but are no more likely to take advanced courses. METCO students are more likely to be tracked to lower performing math and English classes. These differences suggest that METCO effects could be larger with increased access to advanced courses, more Black role models, and lower special education classification rates.

METCO changes the peers, teachers, courses, and school traits that students encounter. Students with METCO offers attend schools where on average 81 percent of students plan to attend four-year college, compared to 62 percent for those without offers. METCO students also attend schools with higher college and high school graduation rates. Students whose parents did not attend college and boys experience the largest increases in school-level four-year college enrollment rates relative to their counterfactual schools. These groups also experience the largest effects, consistent with changes in college-going expectations being an important mechanism.

METCO provides an opportunity to learn about the relative importance of neighborhood versus school quality. This paper isolates the impact of enrolling in a high-performing suburban school while holding students' home neighborhood fixed and therefore speaks to the literature on how school and neighborhood quality affect student outcomes (Sanbonmatsu et al., 2006; Bergman et al., 2024; Laliberté, 2021; Chetty and Hendren, 2018; Chetty et al., 2016; Kling et al., 2007; Chyn, 2018). METCO participants experience a large increase in district value-added. Their gains in college aspirations, enrollment, and completion exceed predicted gains based on district value-added and baseline demographics. These results suggest that students can substantially improve their outcomes by attending higher-performing districts without relocating, implying a larger role for school quality than for neighborhood effects in shaping college outcomes.

A rich qualitative literature documents experiences of METCO students and parents (Boardman and Brandt, 1968; Clarke, 1975; Orfield et al., 1997; Eaton, 2001; Elliott, 1998). Armor (1972) compares a small number of METCO students with their non-participating siblings and finds no benefits to academic achievement or race relations. Mantil (2022, 2018) uses OLS to compare the elementary and middle school test scores of METCO applicants with and without offers from seven birth cohorts and the high school graduation and college enrollment rates for three cohorts. Angrist and Lang (2004) and Setren (forthcoming) find no evidence of negative peer effects of urban students on suburban students in the Brookline school district and across all METCO suburbs, respectively. This paper extends this literature by assembling a comprehensive applicant database spanning the full history of the program, estimating effects on educational attainment and earnings, and exploring heterogeneity and mechanisms across all

participating districts.

More broadly, this paper contributes to the literature on school desegregation.[3] Prior work on court-ordered desegregation finds positive effects on Black students' educational, career, earnings, housing, and health outcomes, with reduced likelihood of incarceration and no effect on White students (Guryan, 2004; Reber, 2010; Johnson, 2011, 2019; Tuttle, 2019). Evidence points to increases in school resources and class size reductions as key mechanisms (Johnson, 2011, 2019; Tuttle, 2019). Effects vary across contexts and cohorts (Anstreicher et al., 2022). Bergman (2018) finds mixed impacts with positive effects on test scores and two-year college enrollment, but no effect on four-year college enrollment and an increase in special education classification and non-violent offense arrests for bussed minority students. This paper adds to the desegregation literature by studying the largest and longest-running voluntary integration program and by examining a broader set of outcomes across 30 recent cohorts and 33 suburban districts.

Finally, this paper relates to the school choice literature. Prior work on within-district choice finds mixed effects on achievement, attendance, and college enrollment (Angrist et al., 2022; Cordes et al., 2022; Deming et al., 2014; Deming, 2011; Hastings and Weinstein, 2008; Cullen et al., 2006; Campos and Kearns, 2023). Bruhn (2023) finds that students earn higher test scores and take more advanced courses when they enroll in a different school district of their choice. Analysis of charter and selective schools finds largely positive effects for urban charter schools and minimal effects for selective admissions schools (Abdulkadiroğlu et al., 2014, 2016; Angrist et al., 2013; Dobbie and Fryer, 2011, 2014; Lucas and Mbiti, 2014; Muralidharan and Sundararaman, 2015; Angrist et al., 2016). Compared to these settings, METCO has a substantially larger shift in peer composition and school quality. This study contributes to the school-choice literature by estimating the impact of a dramatic shift in school outcomes and peer traits.

The next section provides background on the METCO program. Section 2 describes the data sources, Section 3 characterizes the program applicants, and Section 4 discusses the application process and selection concerns. Section 5 presents the identification strategy, followed by the results. Section 7 discusses the METCO treatment by detailing how it changes the school, teacher, peer, and course characteristics students experience. Section 8 presents the heterogeneity analysis and Section 9 concludes.

[3]See Schofield (1991) and Schofield and Hausmann (2004) for detailed reviews of this literature.

1 Background

Origin of the METCO program

METCO formed in the wake of intense opposition to integrating Boston Public Schools and improving school quality for Boston's Black students. Inadequate school facilities and resources, overcrowding, and de facto segregation led to a series of protests and school boycotts from Black parents, students, and community members. A State Board of Education commission that studied school segregation in Boston concluded that the racial imbalance in Boston harmed both Black and White students, but the recommendations of the commission were denounced by the Boston School Committee, who refused to take action.

Faced with opposition from the School Committee, Black parents created Operation Exodus – busing over 400 students from overcrowded schools to under-enrolled schools outside of predominantly Black neighborhoods. This evolved into the METCO program. In January 1966, the school committees of Brookline, Lexington, Newton, and Wellesley voted to accept Black students from Boston, followed by four additional districts. In fall of 1966, 220 K–11 students enrolled in suburban schools. Initially intended as a temporary program until desegregation was implemented in Boston Public Schools, METCO expanded as new districts elected to participate. Meanwhile, court-ordered integration in Boston sparked intense opposition and a series of within-city desegregation busing plans.

To join METCO, the town's school committee or council first voted to participate. Then METCO decided whether to accept the district. Several districts were turned down because there was widespread opposition to the METCO program and the town approved METCO by only a small margin.[4] The program accepted new districts until 1975. Suburban participation was motivated by a mix of educational, social, and moral reasons. METCO's mission statement and materials have consistently emphasized the benefits of racial and ethnic diversity for suburban students, including reduced prejudice and preparation for living in a multicultural society.[5] Suburban religious leaders and newspaper editorials emphasized civic and

[4]METCO rejected Beverly, Georgetown, Randolph, and Winchester in 1974; Winchester had also been rejected in 1967.
[5]See METCO (2024, 1976).

moral responsibility.[6]

Except for four districts that withdrew, participating districts have continued enrolling METCO students.[7] The city of Springfield started its own METCO program with four nearby suburbs that enrolls 150 K–12 students a year. Appendix Figure 1 shows the growth in METCO participation as new districts joined and relatively stable enrollment of over 3,000 students since the 1980s. This study focuses on Boston's METCO program.

Once admitted, students may remain enrolled in their suburban district through graduation. Districts vary in the amount of services they provide urban students. Each district has a METCO Director who oversees the program and admissions process. Some districts have additional services to support students academically, socially, and emotionally and to increase inclusion of METCO students. These include late buses for after-school activity participation, tutoring, access to social workers and counselors, and social programs to foster relationships with students and families at the school. In addition, METCO encouraged the suburban districts to include African and African-American history and culture in the curriculum and exclude racial stereotypes.[8] METCO also encouraged the districts to hire Black teachers and staff.[9] Today, METCO is working with suburban districts to promote antiracist practices (Bleichfeld, 2023).

Funding

Districts receive about $8,900 per METCO student on average, though amounts vary by district and year.[10] Approximately $5,000 comes from a state METCO grant and the remainder comes from the general state education budget which is calculated from prior year counts of grade-level enrollment, English learners, and low-income students. Since the state aid is not itemized into funding for METCO students, it is not transparent to districts how much funding they receive from the METCO program. [11]

[6] Examples of this are documented in Chanoux (2011)'s analysis of the METCO archives and archival newspaper sources.

[7] Milton, Rockland, Hamilton-Wenham, and Framingham ended their METCO programs.

[8] "Guidelines for Metropolitan Boston Communities. . . ," 1970, METCO Archives.
"METCO Handbook," 1976, METCO Archives.

[9] "Guidelines for Metropolitan Boston Communities. . . ," 1970, METCO Archives.

[10] Apfelbaum, Katherine and Ardon, Ken, "Expanding METCO and Closing Achievement Gaps." Pioneer Institute White Paper No. 129. March 2015.

[11] Apfelbaum, Katherine and Ardon, Ken, "Expanding METCO and Closing Achievement Gaps." Pioneer Institute White Paper No. 129. March 2015.

Since METCO students typically fill empty classroom seats instead of causing new classrooms to be formed, districts pay the marginal cost of a student. Under this model, it's possible that districts do not incur costs from hiring new classroom teachers. Districts cover the cost of transportation, special education services, instructional materials, salaries for a METCO program director, and salaries for other program support staff, like counselors.

2 Data

Applicant data

To study the short and long-run impacts of attending suburban schools through the METCO integration program, I collected and digitized application records spanning the program's history from 1966 to the present. The resulting database was constructed from paper application folders with the assistance of archivists, students, and data entry professionals.

The database includes applicants' names, date of birth, application date, race, gender, home address, and sibling names. We also noted whether applicants had a sibling in METCO at the time they applied or received an offer. If applicants received an offer, we collected the offer date and destination district. METCO staff wrote this information on the applicant files. Often, notes about offers or siblings were written in abbreviations on the folders or in the margins of application paperwork. We manually entered handwritten METCO staff notes and application forms because they could not reliably be digitized by computer software.

Starting in 1991, METCO staff entered applicant information into an electronic database. Applicants still completed paper applications and the selection process (described below) continued to rely on paper files. Staff did not always update the electronic database after extending an offer, so I combined information from the electronic and paper files to determine whether and when a student received an offer.

I also collected and digitized additional information from applicant and participant rosters. Some rosters were scanned and digitized using Optical Character Recognition (OCR) software, while others required manual entry because they were not consistently legible to OCR. These rosters provided an additional

source for verifying applicant information. Files came from the Northeastern University METCO Archives and METCO, Inc. offices. In total, I digitized over 250 Bankers Boxes of application files and rosters to create a database of approximately 60,000 METCO applicants.

State administrative education records

I match applicant names and dates of birth to Massachusetts administrative student records from the 2001–2002 through 2022–2023 school years. The analysis focuses on applicants who entered first grade between fall 1990 through 2019 because state administrative outcomes data are available for these cohorts. Eighty-nine percent of applicants match to the K–12 education data (see Appendix Table 1). Unmatched applicants either never attended Massachusetts public schools or could not be confidently matched.[12] This match rate is comparable to other studies using Boston student samples.[13]

The sample for each outcome is restricted to cohorts who are old enough to appear in the administrative data for that outcome. As a result, the main specifications use different cohorts based on the age when the outcome occurs. College outcomes are available for applicants who entered first grade in 1994–1995 through 2005–2006. Earnings data at age 35 are available for those who started first grade in 1990–1991 through 1993–1994. Appendix Table 1 reports cohort-specific sample sizes and match rates across outcomes.

The Massachusetts Department of Elementary and Secondary Education (MA DESE) provided data on enrollment, race, ethnicity, gender, low-income status, special education status, English Learner status, standardized test scores, attendance, suspensions, high school graduation, and dropout. College preparation data include SAT and AP information from the College Board for 2007–2022 and students' plans for after high school from a tenth grade survey.[14]

To understand how the program affects teacher, course, and peer composition, I merge in school staffing data from the Education Personnel Information Management Systems (2007–2008 through 2022–2023) and course information from the Student Course Scheduler (available from 2011–2012 through 2022–2023).

[12] See Data Appendix A.1 for details about the matching process.

[13] Setren (2021) reports a 94 percent match rate among Boston charter school applicants. A somewhat lower match rate is expected here because METCO applicants often apply years before school enrollment and therefore have more time to move out-of-state before appearing in administrative records.

[14] I use students' highest SAT math and verbal scores if they test multiple times.

Class data contain teacher and student linkages, which allow me to investigate peer characteristics.

College data

The National Student Clearinghouse (NSC) database provides college enrollment, persistence, and graduation data. I obtained NSC data for applicants who enrolled in grades 8–12 in a Massachusetts public school from MA DESE and additional NSC records for applicants who attended private or out-of-state high schools.[15] The college analysis sample includes those projected to graduate high school between 2006 and 2017, allowing observation of outcomes through six years following projected high school graduation.

Employment & earnings

Employment and earnings data come from a partnership between the Massachusetts Department of Unemployment Assistance (DUA) and MA DESE. The records include quarterly wages from 2010–2023 for applicants who attended Massachusetts public schools when they were 14 or older and are covered by unemployment insurance. The data exclude federal and military employment, self-employment, and jobs outside Massachusetts. Estimates should be interpreted as the effects on Massachusetts earnings for individuals who attended a Massachusetts high school. Individuals were matched using name, date of birth, and social security number (available only for those who attended a Massachusetts public university). Over 85 percent of Massachusetts public high school graduates appear in DUA records.

Birth records

I matched applicants to Massachusetts Department of Public Health birth records using name and date of birth. Applicants born outside of Massachusetts do not appear in this data. Baseline socioeconomic controls include parental educational attainment at birth and whether prenatal or delivery care was government-funded. Neonatal health measures, including birthweight, gestational age, and Apgar 5 scores (which assess physical health five minutes after birth), are predictive of special needs (Elder et al., 2021) and can help control for unobserved family income and health factors. The data also include marital status, whether

[15]NSC matched the students using name and date of birth.

two parents are listed on the birth certificate, the number of older siblings, and parental race. The Census tract of the parents' home address is linked to Census data to get characteristics of their neighborhood at the time of application. In the K–12 sample, birth records are available for 77 percent of applicants who did not receive offers and 80 percent for those with offers (see Appendix Table 1). Match rates are around 64 percent for earnings outcomes and are not different by offer status.

3 Descriptive statistics

Panel A of Table 1 describes the demographics of applicants (Column 1) and their peers in Boston (Column 2) and suburban schools (Column 4). The racial demographics of METCO applicants during the study period reflect the program's original goals of promoting Black-White integration. Over 70 percent of applicants are Black: twice the rate of Boston Public Schools students who did not apply to METCO. Latinx students comprise 20 percent of the applicant pool, compared to 42 percent of the BPS non-applicants. Asian students and White students are also under-represented in the applicant pool.[16]

The METCO program substantially increases the diversity of the suburban schools, which still predominantly enroll White students. METCO participants are bussed to suburban districts with 3.1 percent Black, 6.6 percent Latinx, and 10.3 percent Asian students. Participation in METCO exposes students to a peer group that is 77 percent White instead of 12 percent White in Boston Public Schools.

Students with disabilities that might require additional transportation assistance, such as a smaller bus or an aide, are less likely to apply for METCO.[17] Only 2.4 percent of applicants have one of these disabilities compared to 3.4 percent of BPS students that did not apply.

Immigrant families are also underrepresented: they are over eight times less likely to apply for METCO compared to BPS non-applicants. This underrepresentation partially stems from the timing of their arrival in the Boston area: children who apply at an older age are less likely to be admitted from the waitlist and immigrant students on average apply later than non-immigrant students.

[16]Recent recruitment efforts have sought to make the applicant pool more reflective of Boston's racial and ethnic diversity (Vaznis, 2019).

[17]These disabilities include physical, autism, emotional, intellectual, multiple disabilities, sensory (hearing or vision), neurological, and developmental delay disabilities. Disability identification may vary by school, but these are among the less variably diagnosed disabilities with the exception of autism.

Access to public preschool is similar across applicants (26 percent) and those who do not apply for METCO (23 percent). Applicants live across the city of Boston, with 42 percent coming from Dorchester, 17 percent from Mattapan or Roslindale, and 16 percent from Roxbury. Unfortunately, I do not have neighborhood information for non-applicants. Neighborhood representation is similar for students who ultimately participate in the program, suggesting that offer acceptance rates are similar across neighborhoods.

Panel B of Table 1 shows that participating in the METCO program exposes students to peers with different outcomes and classifications than they would have experienced otherwise.[18] About 48 percent of METCO participants are classified as economically disadvantaged, compared to only 10 percent of their suburban peers.[19] In contrast, the rates in Boston are around 74 percent. When students participate in METCO, they attend schools with lower rates of special education classification and English Learners than they would have in Boston schools. English Learners comprise about 30 percent of Boston compared to four percent of suburban districts. About 24 percent of Boston students have a special education status compared to 19 percent in the suburban METCO districts. METCO participants have classmates who rarely get suspended: under one percent of suburban peers get suspended in the fifth grade. METCO applicants who enrolled in BPS or Boston charter schools attend schools with substantially higher suspension rates. METCO participants also have peers with average attendance around 95 percent, marginally higher than rates in Boston schools. Lastly, participating in METCO leads to a major change in classmates' academic performance. Suburban residents score 0.45 standard deviations above the state mean on standardized math and English tests while Boston students score below the state mean.

Panel C of Table 1 indicates that METCO applicants come from a range of family backgrounds. There is a mix of family structures among METCO applicants at the time they were born. About 38 percent of applicants had married parents, 24 percent did not have a father listed on their birth certificate, and the rest

[18]Since enrollment choices, outcomes, and classifications (such as English Learners, economically disadvantaged, and special education) vary over time, Table 1 reports characteristics in grade 5, when testing outcomes are available and the most common charter entry grade has passed.

[19]From 2000–2014, economically disadvantaged was defined as receipt of free or reduced price lunch. Beginning in 2015, the designation was based on participation in at least one means-tested assistance program: the Supplemental Nutrition Assistance Program (SNAP), the Transitional Assistance for Families with Dependent Children (TAFDC), the Department of Children and Families' (DCF) foster care program, or MassHealth (Medicaid).

had two unmarried parents. Fifty-three percent of applicants were born to parents with government-funded medical coverage.

METCO applicants' parents have varied levels of educational achievement. Twelve percent of mothers and 6.7 percent of fathers did not complete a high school degree. Over 17 percent of mothers graduated from a four-year college, and about 10 percent earned a two-year degree and did not pursue more education. The most common education level for parents is completing a high school degree and not enrolling in college (37 percent for mothers and 34 percent for fathers). Starting a college degree but not finishing is also common (23 percent for mothers and 15 percent for fathers).

Columns (2) and (4) of Panel C of Table 1 show that METCO participation places students with peers who have substantially higher parental education and marriage levels, lower Medicaid receipt, and lower levels of absent fathers.[20] METCO participation shifts students from having peers with family structure similar to their own to peers where 92 percent were born to married parents. In the METCO program, students' peers have higher income levels, with eight percent receiving government assistance at birth compared to more than half in Boston Public Schools. Instead of the range of peer parental educational achievement levels students would experience in Boston, METCO students have peers where only two percent of parents did not complete high school and over 67 percent completed college.

Thirty-four percent of Boston students apply to the program and 11 percent participate in METCO for at least one grade level. Over half of all Black Boston students apply to METCO, compared to 20 percent of Latinx students. For comparison, 35 percent of Boston students applied to charter schools in 2013 (Cohodes et al., 2021). The high demand reflects that parents think that METCO will offer a better educational experience for their children.

4 Application and admissions process

To apply for the METCO program, parents or guardians completed application forms and submitted proof of Boston residence. Parents could apply at any point after their child's birth through 12th grade. About 70 percent of applicants applied before first grade. When suburban districts planned for the following

[20] Defined as no father or second parent is listed on the birth certificate.

year, they informed the non-profit organization that administers METCO in Boston, METCO, Inc., how many spaces were available for METCO students in each grade. In addition to requesting students for certain grades, suburban districts could also request gender and racial composition for incoming students to balance the gender ratio in the classroom or increase representation of certain racial groups (i.e., if a school had few Black students, but a substantial Latino population, they could request Black students). METCO, Inc. then filled these district requests by selecting students within the relevant grade, gender, and race categories.[21] Districts sent METCO their requests from February to early fall, whenever the district was ready.

As districts notified METCO of available spots, METCO selected applicants and notified families. Parents were not able to express preferences over districts. For example, if Weston Public Schools notified METCO they had two seats for first grade girls and two seats for first grade boys in April, then METCO would offer Weston seats to two first grade boys and girls. The parents could choose to accept or decline the offer to that district. While parents may have preferred certain districts, the staggered timing of when districts notified METCO of availability prevented parents from timing applications in a way that would increase their chances of receiving an offer from a particular district.

Parents were more likely to accept offers from nearby districts. If a student declined an offer, they were supposed to lose their place on the waitlist. In some cases, the district declined to accept the student and then the student returned to the top of the waitlist. In other cases, families were kept on the waitlist if METCO mistook whether the student was ready for first grade versus kindergarten and an older sibling was already enrolled in a different district. I consider only the first offer date and assigned district in the analysis since there may be selection into receiving a second offer. After receiving and accepting an offer, the parent worked with the suburban school district to enroll.

Students were supposed to receive offers according to a waitlist that prioritized applicants by application date within grade, gender, and racial subgroups. In practice, the system was not strictly followed because application folders were not organized by waitlist order. Staff instead searched through the files until they found students who met a district's grade, gender, and race request. Non-adherence to the waitlist due to

[21] Due to this aspect of the offer process, I control for gender and race indicators in all analyses, including balance tests.

file disorganization is likely unrelated to students' future academic performance. However, deviations from the waitlist due to parents checking in with admissions could result in more privileged students receiving offers. The potential biases in the admissions process are addressed in the next section.

I restrict the sample to students who applied before first grade. This reduces potential selection issues, since families have not yet interacted with the school system and the METCO office has no knowledge of students' academic ability. Furthermore, few older applicants without sibling preference received offers, so the sample size would not be adequate.

5 Identification strategy

5.1 Balance across METCO offer status

Column 2 of Table 2 shows the difference between those with kindergarten or first grade METCO offers and those who applied but did not receive offers. The comparison controls for the applicant characteristics that impact admission probabilities according to the waitlist policy: grade, race, gender, and linear and quadratic age at application. The sample excludes applicants whose admissions chances were higher because they had an older sibling already in the program.

Less than two percent of applicants have a disability that may affect their busing needs and those with offers are 0.6 percentage points less likely than those without offers. Two percent of applicants are immigrants and there is no significant difference in offers by immigrant status. About 30 percent of applicants attend public pre-k in Massachusetts, which is similar across offer status.

Applicants with and without offers lived in similar neighborhoods at the time they applied: Dorchester was the most common neighborhood, followed by Roxbury, Mattapan, and Roslindale. At the Census block group level, applicants' neighborhoods have similar demographics. On average, the neighborhoods of applicants both with and without offers have similar proportions of adults with high school degrees (27 percent) and college degrees (18 percent). About 54 percent of households are single-parent households. Neighborhood single-parent household rates and median gross rent are also not statistically significantly different across applicants who receive offers and those who do not. There are some small, statistically

significant differences in neighborhood homeownership rates and public-assistance receipt by offer status. On average, those without offers live in neighborhoods where 36 percent of households own their homes. Neighborhood homeownership rates are 2.5 percentage points higher for those with offers. Applicants with offers live in neighborhoods where 29 percent of households receive Supplemental Nutrition Assistance Program (SNAP) or public-assistance income. Neighborhood public-assistance receipt is less than one percentage point lower for applicants with offers.

Applicants with and without offers have similar health at birth, measured by birthweight and Apgar 5 scores. Marriage rates at the time of birth are also similar across offer status. Those with offers are 2.7 percentage points less likely to have a father not listed on their birth certificate and 6.6 percentage points less likely to have had their birth or prenatal care paid for in part by the government (through Medicaid or another program).

Fathers' educational attainment is similar across offer status. However, there are differences in mothers' educational attainment. Those with offers are 4.3 percentage points more likely to have mothers who completed college (20 percent of the non-offered mean). Those with offers are 3.3 percentage points less likely to have mothers who stopped their schooling after receiving a high school diploma (9.7 percent of the non-offered mean). Column 3 and 4 show similar balance when I change the endogenous variable from receiving an offer in kindergarten or first grade to ever getting an offer.

While some differences between those with and without offers remain for maternal education, father absence, and Medicaid receipt, restricting the sample to METCO applicants reduces a large portion of selection bias compared to a naive OLS. Columns 5 and 6 illustrate the degree of selection bias in simple comparisons between METCO participants and all Boston public school students. They show that this paper's approach of restricting to applicant data and using METCO offers as instrumental variables reduces a substantial amount of selection bias relative to the naive OLS. Without restricting to who applied, we see much larger differences between METCO and non-METCO Boston residents with statistically significant differences for all available characteristics.[22] The comparison highlights substantial selection bias into applying for the program: immigrant students, students with absent fathers, and students on Medicaid

[22]Neighborhood and Census block group information is not available for the non-applicants.

are less likely to apply, while students with married parents and more educated mothers and fathers are more likely to apply. Restricting the sample to applicants removes the majority of these differences. For example, the imbalance in maternal college completion is 0.04 for the applicant sample compared to 0.15 for the full Boston sample. The difference in maternal college completion between treated and comparison groups falls from 83.3 percent in the full sample to 20.3 percent in the applicant sample. The imbalance in Medicaid receipt at birth falls from 0.24 to 0.07, reducing the difference between treated and comparison groups by two-thirds (39.9 percent of the comparison group mean to 12.7 percent). For absent fathers, the difference falls by about four-fifths, from 55.9 percent to 11.8 percent, when restricting to the applicant sample. For infant health, parental marital status, fathers' education, and mothers with some college or a two-year degree, differences are no longer statistically significant. While restricting the sample to applicants substantially reduces selection bias, some differences remain across offer status, so I conduct additional robustness checks (discussed in Section 6.5).

5.2 Empirical specification

To estimate the effect of METCO, I compare the outcomes of those who applied and received an offer to those in the same application timing, gender, and race groups that did not receive an offer. I use two-stage least squares (2SLS) analysis because not all students with METCO offers accept them. To identify the impact of METCO for students induced to participate by receiving an offer (the compliers), district-specific offers serve as instrumental variables. Since METCO gives offers to specific school districts and offer acceptance rates vary across districts, using district-specific offer indicators as instruments improves the first-stage (see Appendix Figure 2).

The second-stage estimating equation is:

$$y_{igt} = \alpha_t + \gamma_g + X_i^{'}\theta + \varphi M_{igt} + \epsilon_{igt} \tag{1}$$

where M_{igt} indicates whether student i participates in METCO in grade g and year t. I include fixed effects for projected first grade entry year α_t and control for whether the applicant is in the applicant pool

for kindergarten and/or first grade γ_g. Baseline demographic characteristics, represented by vector $X_i^{'}$, include gender, race, economically disadvantaged status, home neighborhood indicators, immigrant status, and age at the time of application in months (linear and squared).[23] Controls also include whether the student has a documented disability by first grade that may require special transportation and whether the student is ever categorized as an English Learner. Since siblings of current METCO participants get priority on the waitlist, I exclude applicant-grade observations for which an older sibling was already participating in METCO.

The parameter φ captures the effect of METCO participation for compliers. The first-stage equation is:

$$M_{igt} = \lambda_t + \delta_g + X_i^{'}\Gamma + \sum_d \pi_d Z_{idgt} + \eta_{igt} \tag{2}$$

Indicators for whether student i received a METCO offer from suburban district d are denoted by Z_{idgt} and equal one if applicant i receives an offer from district d by grade g and year t.

For high school, college, and employment outcomes, I use M_i which equals one if student i ever participated in METCO, and Z_{id} as instruments for whether student i ever received an offer from district d.

6 Results

6.1 Test score & behavioral outcomes

Getting a METCO offer by 12th grade increases the likelihood of participating by 79 percentage points and increases time spent in the program by 7.2 years compared to those who never receive an offer (see Appendix Table 4). Table 3 indicates a strong first-stage: receiving an offer by 3rd grade increases the likelihood of METCO 3rd grade participation by 66.7 percentage points. The first-stage for the 4th grade outcomes shows that receiving an offer by 4th grade increases the likelihood of METCO 4th grade participation by

[23]Neighborhood indicators come from the address listed at the time of the application and include downtown Boston, Dorchester, Roxbury, Mattapan and Roslindale, and other neighborhoods.

66.4 percentage points. The first-stage for each subsequent grade remains above 50 percentage points. The first-stage declines because some students transfer out of the program. Over 50 percent of students with offers stay through 12th grade, but about 32 percent of those with kindergarten or first grade METCO offers leave earlier.[24]

METCO increases test scores and attendance and reduces suspensions (see Table 3). Students who applied before first grade but never participated in METCO scored 0.40 standard deviations (SD) below the state average on the end of year third grade math exam. METCO moves students closer to the state average. Two years in a suburban school raises third grade scores by 0.12 SD in math and 0.19 SD in English. Effects are similar in grades four and five and statistically significant. Middle school math effects are weaker, with insignificant positive estimates for sixth and seventh grade and a significant 0.09 SD in eighth grade. METCO increases 10th grade scores by 0.13 SD. Effects for English Language Arts are larger and consistently statistically significant. METCO participation leads to 0.14 to 0.21 SD gains across 3rd through 10th grades.

Using years spent in METCO instead of whether the applicant participated in METCO in a specific grade gives the average annual effects rather than the cumulative impacts. For applicants observed in third grade, each year in the METCO program increased their math test scores by 0.04 SD (see Appendix Table 4). Effects are similar in grade 3 through 5 (about 0.03 SD per year) and smaller in grades 6 through 10 (about 0.01 SD per year). English results show 0.03 to 0.06 SD per year in grades 3 through 5 and 0.02 SD per year in grades 6 through 10. For both math and English, effects across grades are not statistically significantly different. Overall, the annual effects of suburban enrollment are consistently positive across grades.

To put these results in context, by third grade, METCO participants are one-third closer to the state mean in math and 49 percent closer in English than those without offers. By tenth grade, they are near the state mean in English and 50 percent closer to the state mean in math. Effects are smaller than the Boston charter school impacts which range from 0.2 to 0.4 SD per year of attendance (Angrist et al., 2013).

Suburban schools are farther away and less connected to public transit, which could reduce attendance.

[24]Among early-offer recipients, about 12 percent leave in high school, 10 percent leave in middle school, and 10 percent leave in elementary school. The remainder either decline offers or leave after one year.

However, there is no evidence of reduced attendance: students in METCO have marginally higher attendance rates. Third graders who do not get METCO offers have a 91 percent attendance rate. Participating in METCO significantly increases attendance for nine of the grade levels with effects ranging from 2.0 to 5.1 percentage points. Therefore, METCO increases attendance by three to nine days a year.

About five percent of applicants without offers get suspended in the third grade. Suspension rates for this group reach over 14 percent in middle and high school. Participation in METCO lowers the likelihood of suspension substantially by 2.8 to 6.8 percentage points for grades three through nine. Effects are not statistically significant for 10th through 12th grade. In contrast, Boston charter schools substantially increase the likelihood students are suspended (Cleveland et al., 2025).

6.2 High school graduation & college preparation

Participating in METCO increases the four-year high school graduation rate by 18 percentage points. It also increases the likelihood of graduating within five years by 14.4 percentage points. METCO reduces the high school dropout rate by 4.3 percentage points, a 75 percent reduction (see Table 4). These estimates can be interpreted as the effect of 7.2 years in a high-performing suburban district since a METCO offer increases participation by that amount.

Table 4 shows mixed effects of METCO on college-preparatory outcomes. METCO makes students 6 percentage points more likely to meet the standardized testing requirements for high school graduation in Massachusetts. These requirements are based on 10th grade math, English, and science test scores. Meeting this requirement also means that students continue with a college-preparatory course load instead of remedial coursework.

The Massachusetts merit-based Adams Scholarship is based on students' relative rank in their school. Since METCO students perform relatively worse than their suburban peers on the state exams, participating in METCO makes them 12.2 percentage points less likely to earn this scholarship. While students have reduced aid options, it could have a positive effect on their likelihood of college completion. Cohodes and Goodman (2014) find marginally winning this scholarship induces students to choose lower quality colleges and in turn lowers the likelihood of college completion.

METCO participation increases the likelihood of taking the SAT by 15.1 percentage points. Forty percent of applicants who do not participate in METCO score 800 or higher on the SAT. Participating in METCO increases this likelihood by 14.6 percentage points. Attending suburban schools also boosts the likelihood students earn SAT scores of at least 1,000 by 8.0 percentage points. METCO increases the likelihood that students earn 1,200 or higher on the SAT by 2.0 percentage points, a 33 percent increase compared to non-participants.

However, METCO does not increase the likelihood that students earn high SAT scores of 1,400 or more, which only 1.4 percent of applicants achieve. Attending the suburban schools reduces the likelihood students take an AP exam by 7.0 percentage points and lowers the average number of AP exams students take. It does not affect the likelihood of scoring a passing score of three or higher.

METCO shifts students' aspirations for after high school towards four-year colleges. In a survey administered to 10th graders, METCO participants are 11.9 percentage points more likely to say that they want to go to college. In addition to increasing college-going aspirations overall, METCO reduces the odds students go to two-year colleges by 5.6 percentage points and increases the likelihood students aspire to four-year colleges by 17.5 percentage points. Given the relatively lower completion rates in two-year colleges in Massachusetts, students setting their sights on four-year colleges could have a positive impact on college completion.

6.3 College outcomes

Table 5 shows the impact of METCO participation on college enrollment, persistence, and characteristics. Increases in college enrollment from the METCO program are larger than the increases in college aspirations. About 66 percent of non-METCO applicants enroll in college. Attending a suburban school increases college enrollment by 18.6 percentage points. Students are similarly likely to enroll in two-year colleges and 22.1 percentage points more likely to enroll in four-year colleges. This reflects a 49 percent increase in four-year college enrollment. Students are more likely to enroll in both public and private four-year colleges, but the largest growth is private four-year college enrollment.

Panel C of Table 5 shows the impact of METCO on the Barron's rankings of colleges students choose.

METCO increases the likelihood students enroll in competitive colleges. Students are 18.9 percentage points more likely to enroll in schools ranked as competitive or higher. The increases in college enrollment are accompanied by similarly large increases in enrollment in competitive colleges. METCO students are 3.7 percentage points more likely to enroll in the next highest tier, very competitive, and 2.3 percentage points more likely to enroll in the second highest tier, highly competitive. METCO increases enrollment in the most selective category by 0.9 percentage points, a 33 percent increase relative to the applicants who did not participate in METCO.

Panels D and E explore whether the program changes the likelihood students persist and graduate from college. METCO increases the likelihood students persist through college, with effects declining in later semesters. Participants are 17.7 percentage points more likely to persist to the second year of college. They are 16.7 percentage points more likely to reach their junior year and 15.0 percentage points more likely to reach their senior year. Ultimately, they are 13.0 percentage points more likely to graduate with a four-year degree. Therefore, METCO increases college persistence, but not all students who are induced to enroll in college persist. The increase in four-year college graduation reflects a 56 percent increase from the 23 percent graduation rate among the comparison group. The improvement in four-year college graduation is about half the size of the Massachusetts Black-White four-year college completion gap (24.7 percent).[25]

Similar to the enrollment findings, METCO does not change the likelihood of graduating from a two-year college while still increasing the overall college completion rate. While the test score impacts of METCO were smaller than the Boston charter school effects, the METCO college effects are larger. Attending a Boston charter school increases college graduation by 4.1 percentage points from a comparison mean within one percentage point of the METCO sample's (Cohodes and Pineda, 2024).

Attending majority White elementary and secondary schools might lead students to feel more comfortable on less diverse college campuses or increase their desire to attend more diverse colleges. On average, METCO applicants choose colleges where the student body is 53 percent non-White and 30 percent Black or Latinx. METCO participation induces students to choose colleges with marginally fewer Black and Latinx students. While METCO increases the likelihood of attending a Historically Black College or

[25]From author's calculations using state administrative education data and National Student Clearinghouse data for students who attended public high schools and were projected to graduate high school between 2013 and 2019.

University (HBCU), this effect may be driven by the overall increase in college enrollment.

6.4 Labor market outcomes

Table 6 shows that METCO improves earnings and increases the likelihood of working in Massachusetts. At age 25, METCO increased earnings in Massachusetts positions that contribute to payroll taxes by $7,708 annually.[26] This effect size is more than double the non-METCO average of $7,623. By age 30 and 35, METCO has larger positive effects on earnings of $14,091 and $16,250 respectively.

These estimates count the annual average salary as zero if individuals are unemployed, work out-of-state, or have jobs that don't contribute to payroll taxes. Column 3 shows that over 75 percent of applicants that never attended METCO do not appear in the Massachusetts wage data at age 25. METCO increases the likelihood that applicants appear in the data and therefore work in Massachusetts, by 23 percentage points. This pattern continues through age 30 and 35.

Since the labor data exclude those who work out-of-state or in non-payroll-tax positions, it is difficult to disentangle how much of the earnings and employment effects are due to METCO reducing unemployment, out-of-state moves, or non-payroll-tax employment. To make progress on this, Columns 5 through 8 restrict the sample to individuals who appear in the Massachusetts labor data at least once between the ages of 19 and 35. This removes the approximately one third of the sample who lived out-of-state during their 20s and early 30s and those who only had non-payroll-tax jobs. After this restriction, METCO participants are not more likely to be employed at age 30 or 35. Employment effects in Column 4 therefore appear to be driven by an increased likelihood of remaining in Massachusetts and/or a reduced likelihood of working in non-payroll-tax jobs. The income effects persist in this restricted sample (Column 6), meaning that METCO alumni who work in Massachusetts for at least one year from ages 19 to 35 earn more than applicants who did not attend METCO. Differential rates of appearing in the labor data across offer status do not fully explain the income results.

Columns 9 and 10 show the earnings mean and effects for those with non-zero earnings. The average salary among non-METCO alumni who work in Massachusetts at age 35 is $40,559 while those who

[26] Federal, military, and self-employment earnings do not contribute to payroll taxes.

participated in METCO and work in Massachusetts earn $16,000 more, a 40 percent increase. The effect sizes are similar to Column 2 where annual earnings were equal to zero for those missing from the labor data. The earnings differential is therefore not fully driven by the higher rates of METCO participants in the wage data, but also stem from higher earnings among the employed.

6.5 Selection bias

I conduct a series of robustness checks to address concerns about selection bias arising from imbalances in mothers' education levels, absent fathers, and Medicaid receipt across offer status and non-adherence to the waitlist system. Although applicants who applied at younger ages were more likely to receive offers, the waitlist was not strictly followed: only 51 percent of those who applied before turning one year old were admitted (see Appendix Figure 3). Non-adherence due to file disorganization is unlikely to be related to students' future academic outcomes, but parental contact with the admissions office may have increased the likelihood that more advantaged applicants received offers.

A key concern is that parental contact with the admissions office increased offer probabilities. If this happened, students who received offers may have had more motivated parents or parents with more flexible schedules. Those parent traits could make children with offers predisposed to perform better in school. Age of application can proxy for parent motivation, since it is related to parents' knowledge of schooling options, eagerness to apply, and ability to navigate the application process. Controlling for application timing does not alter the point estimates. After controlling for who applies, there does not appear to be positive selection on application timing. Results are stable when birth record and neighborhood characteristics are included as controls (see Appendix Table 3 and Data Appendix A.3). Any remaining bias would therefore need to arise from unobserved factors unrelated to application timing, neighborhood characteristics, health at birth, family structure, income status at birth, and parental education.

To assess whether the remaining imbalances in Medicaid receipt, father absence, and parental education could explain the results, I use the full set of baseline characteristics to predict college enrollment and graduation among applicants who never participate in METCO (see Appendix Table 5). Predicted college enrollment and graduation differ by only one percentage point between applicants with and without offers.

[27]

Selection bias could still arise from unobserved characteristics that are orthogonal to the baseline controls and affect both offer receipt and later outcomes. Appendix Table 6 reports the sensitivity analysis proposed by Altonji et al. (2005) and Oster (2019). Column 2 shows the proportion of variation in outcomes that is explained by the full set of baseline controls. Column 3 displays how large the selection on unobservables, δ, would need to be for the treatment effect to equal zero. Under Oster's recommended assumption that the maximum R-squared in a model that includes all unobserved and observed variables is 1.3 times the R-squared from the model with all observable controls, selection on unobservables would need to be 12.4 times as large as selection on observables for METCO to have no impact on 10th grade English results. Column 4 shows the bias-adjusted intent-to-treat estimate, assuming that the amount of selection on unobservables equals the amount of selection on observables (δ =1). The bias adjustment yields a 10th grade English exam effect of 0.083 SD, similar to the unadjusted intent-to-treat estimate of 0.089 (see Columns 4 and 5).

Under the more conservative assumption that the maximum R-squared is twice the observed R-squared, selection on unobservables would need to be 3.8 times as large as selection on observables for there to be no METCO impact on 10th grade English scores (see Column 6). Across outcomes, bias-adjusted estimates remain close to the baseline estimates, indicating that unobserved factors would need to explain a much larger portion of selection than the rich set of baseline characteristics to overturn the results.

To further address selection bias concerns, I estimate a family fixed effect model to control for time-invariant family characteristics, such as parental motivation and involvement, that may affect both admission and outcomes. The sample includes families in which at least one child received a METCO offer and at least one child did not, which is 17.5 percent of applicant families with at least two children.[28] Differences in offer status among siblings arise because districts have space available for one grade-year

[27]Differences in baseline traits explain at most five percent of the college enrollment effect and eight percent of the college graduation effect.

[28]Appendix Table 7 shows that the sibling sample is similar to the main analysis sample in terms of health at birth (differences are statistically, but not substantively, significant), gender balance, neighborhoods and neighborhood traits. The sibling sample is more likely to be Black, have married parents at the time of their birth, not have a father listed on their birth certificate, have an older sibling, attend public pre-school, and have more educated parents. They are less likely to be on Medicaid at birth, English learners, immigrants, Latinx, and have a disability that requires special transportation.

combination but not another, even when sibling preference applies.

The identifying assumption is that, within families, variation in METCO offers is unrelated to children's potential outcomes. This assumption would be violated if parents differentially advocated for particular children based on expected gains from participation and such advocacy affected admission probabilities. If children with better potential outcomes are more likely to be admitted, that would bias toward finding a positive METCO effect. A primary motive for contacting the METCO office after one child was admitted was to place siblings in the same district, which is likely unrelated to children's potential outcomes. Parents may also have been more likely to communicate with the office once they had another child in the program. However, if parents advocated more strongly for children they believed would benefit most from METCO, the estimates could be biased upward. Unfortunately, I do not observe parental contact with the METCO office or its influence on admissions decisions.

Within families, siblings with and without METCO offers have similar health at birth, neighborhood traits at birth, family structure, and parent educational levels at birth (see Columns 5 through 9 of Appendix Table 7). Siblings with METCO offers are 12 percentage points more likely to be female and four percentage points less likely to have been born to parents receiving Medicaid, less likely to have attended public pre-k, and 12 percentage points more likely to be the oldest sibling.

This method controls for any time-invariant family characteristics, but not changes in the family's environment or financial situation. The sibling who does not participate in METCO is on average 1.3 years younger, so changes to family characteristics are unlikely to have large differential effects across siblings.

Table 7 reports the family fixed effects estimates. Comparing siblings where at least one participated in METCO and at least one applied but did not participate yields large and statistically significant effects on academic outcomes. Intent-to-treat estimates comparing siblings with and without offers similarly show positive effects on on-time high school graduation, aspirations to attend a four-year college, and four-year college completion.[29] The similarity between the baseline estimates and the family fixed effects estimates

[29]Concerns that larger families disproportionally influence the estimates are mitigated by the fact that 85 percent of families in the family fixed effects sample have three children or fewer, and the results are robust to restricting the sample to families with only two siblings.

indicates that unobservable family characteristics are unlikely to drive the results.

6.6 Attrition

Receiving a METCO offer increases the likelihood that students enroll in or remain in Massachusetts public schools by 5.8 percentage points and therefore appear in K–12 administrative data. The match rate is high (89 percent), limiting attrition concerns. However, students who do not receive offers are more likely to enroll in private or out-of-state schools. If those students would have performed better academically on average, differential attrition would lower outcomes among non-offered applicants and overestimate program effects. Labor market outcomes, which are only available for former Massachusetts public high school students, also have similar attrition concerns. Among the sample that enroll and graduate from Massachusetts public high school over 85 percent appear in the adult earnings data. Therefore, attrition concerns for earnings outcomes should be similar to those of high school graduation. Appendix Table 8 shows tests for differential attrition by offer status across outcomes.

College outcomes are less vulnerable to attrition concerns because I search for all applicants in the National Student Clearinghouse (NSC) data, including those who never enrolled in or left the Massachusetts public school system. Students do not match to the college data if they do not enroll in college. Therefore, not matching reflects an outcome of interest: not enrolling in college.[30] Any attrition in college results would stem from college enrollees not matching to the college data due to typos or variations in spelling. Because these matching issues should not vary systematically by offer status, differential attrition is unlikely to bias the college results.

A useful comparison is between 10th grade aspirations to attend four-year college, which are subject to K–12 attrition, and actual four-year college enrollment, which is not. METCO increases four-year college aspirations by 18 percentage points and four-year college enrollment by 22 percentage points. The similarity of these estimates is inconsistent with large upward bias in the high school results due to attrition.

Appendix Tables 9 show the range of intent-to-treat effects using Lee bounds (Lee, 2009). Estimates

[30]Dynarski et al. (2015) find that NSC covers over 95 percent of Massachusetts colleges and universities and over 90 percent of US undergraduate institutions in 2011. Over time NSC's coverage has increased and the college outcomes for this paper start in 2013 (Dynarski et al., 2015).

rule out negative and null effects for high school graduation, SAT taking, and four-year college aspirations, enrollment, persistence, and graduation. Lee bounds intent-to-treat estimates or test scores and earnings are noisier and discussed in Data Appendix A.3.

I also use baseline characteristics to predict non-matching to the state administrative education data and estimate the impact of METCO for those predicted most likely to attrit in Appendix Table 10. Applicants in the top and bottom quartile of predicted attrition have positive and significant estimates for key outcomes: high school graduation, SAT taking, four-year college aspirations, four-year college enrollment. Data Appendix A.3 provides a more detailed discussion of attrition.

6.7 Robustness across cohorts

Appendix Table 2 shows that results are substantially and statistically significant across the different analysis samples. However, the magnitude of the point estimates changes across samples. For example, METCO increases four-year college enrollment rates by 21.1 percentage points for the set of students who reach age 19 in the data and increases enrollment by 28.3 percentage points for those who reach age 35. Appendix Figure 4 shows relatively similar estimates for 10th grade outcomes across individual grade cohorts.

7 Impact on school experience

The above analysis shows that attending a suburban school increased college aspirations, enrollment, and graduation and earnings. This section examines how the program changes students' school environments, focusing on school quality, peers, teachers, and course access.

Participating in METCO also enrolls students in districts with higher value-added (see Column 2 of Table 8). District value-added estimates control for a rich set of student demographic and birth-record characteristics to isolate the contribution of districts to long-run outcomes.[31] Applicants who receive

[31]District value-added estimates control for student demographics (gender, race, and low-income, special education, immigrant, and English learner classifications), levels of special education and English learner inclusion, and birth records characteristics (birthweight, Apgar scores, parent education levels, prenatal care quality, family structure, and Medicaid receipt).

METCO offers attend districts that generate larger gains for college aspirations, high school graduation, college enrollment, and college graduation compared to the districts applicants without offers attend. These results indicate that METCO shifts students into districts that generate better outcomes even after accounting for differences in student background.

If living in a suburban neighborhood had a large positive effect separate from attending the suburban school, then the predicted outcomes would be smaller than the actual outcomes of METCO students. Instead, students' observed long-run outcomes exceed the outcomes predicted by district value-added and their baseline covariates (see Column 5 of Table 8). METCO students graduate four-year colleges 15 percentage points more than the prediction. College aspirations and enrollment rates are also 8 and 7 percentage points larger than the prediction, suggesting that attending a suburban school drives most of the benefits of living in a suburban neighborhood.

The predicted outcomes could be smaller than the actual outcomes because of benefits from the METCO program that are separate from the suburban districts like METCO summer programming, tutoring, and college preparation. The difference could also arise if the effects of the suburban districts are larger for urban students than suburban residents. This is plausible given the large increase in college expectations, resources, and district value-added relative to urban students' counterfactuals.

7.1 School type & characteristics

Appendix Table 12 summarizes the school enrollment patterns of applicants who do not receive METCO offers. Among applicants without offers, roughly 40 percent attend Boston Public Schools, about nine percent attend charter schools, and nearly 20 percent move to another district. Only four percent move to a METCO suburb to attend as a resident; most move to urban districts. A substantial share also leaves Massachusetts public schools for private or out-of-state schools.

Panel C of Appendix Table 12 shows the average high school outcomes of schools applicants attend. Applicants who receive METCO offers attend high schools with substantially higher graduation rates and four-year college aspirations, enrollment, and completion rates. Those with offers attend schools where 81 percent of students aspire to attend a four-year college, roughly 20 percentage points higher than for those

without offers. These patterns indicate that METCO substantially changes the college-going expectations that students are exposed to.

Table 9 shows that average teacher salary is about $3,000 higher in METCO while average spending per pupil is $300 less. Spending and salary differences vary by METCO district and the types of schools non-offered students attend. METCO participants experience classes that are approximately 3.4 students smaller (see Table 9).

7.2 Teacher characteristics

METCO participation exposes students to more experienced and higher value-added teachers (see Table 9). METCO students' core class teachers are 7.4 percentage points less likely to be novice teachers. METCO participation increases teacher value-added by 0.170 SDs.[32] METCO participation reduces exposure to teachers of color by 19.1 percentage points. Given evidence that same-race teachers can improve educational attainment for Black students, this change may offset some of the program's benefits (Gershenson et al., 2022).

7.3 Peers

Participating in METCO substantially changes the composition and academic characteristics of applicants' peers (see Table 9). METCO more than doubles the share of White classmates and reduces the share of Black or Latinx classmates by more than half. Over 50 percent of non-METCO participants' classmates are low-income, compared with less than 15 percent for METCO participants.

METCO participants are exposed to fewer English learner classmates but a slightly higher share of special education peers. METCO also substantially increases exposure to high performing peers. The lagged math and English test scores of METCO participants' classmates are more than 0.56 SD higher than those of non-participants' classmates.

METCO participants also have classmates with somewhat higher attendance rates and substantially

[32]Value-added measures are calculated following Chetty et al. (2014) on non-METCO students. Controls include year of birth, low-income status, gender, special education status, English learner status, Black and Latinx indicators, and lagged test scores. Value-added is estimated for math and English core-subject teachers who taught from 2012 through 2019.

lower suspension rates. Non-METCO ninth graders have classes where 12 percent of their classmates were suspended in the past year, which is about twice the rate METCO students experience. Together, these estimates indicate that METCO students are exposed to peers with stronger prior achievement and fewer disciplinary incidents.

7.4 Course offerings & taking

METCO expands course availability, particularly in foreign languages, arts, and AP courses (see Table 9). Participants complete 0.39 more years of foreign language coursework and take more arts, math and science courses. Despite greater access to AP classes, METCO students are less likely to take AP courses and are more likely to be placed in relatively lower performing classrooms. I measure tracking using the difference between a class's average lagged test score and the grade-level average within a school. METCO participation increases the chance that students are in math and English classes with relatively lower performing peers.

Among non-METCO students, average class achievement is close to the grade mean. METCO students take math classes where their peers score approximately 0.393 SD below the grade mean and 0.188 SD below the grade mean in English. These estimates indicate that METCO students are more likely to be assigned to lower-achieving classrooms within their schools. Being placed in a lower than average performing classroom is 16 to 23 percentage points more likely in METCO depending on the grade and subject. Together, the tracking and AP enrollment results indicate that METCO students do not consistently access the most academically rigorous instructional settings in within suburban schools. It is possible that METCO could have a larger impact on college outcomes if AP course taking increased and participants were more often placed in higher performing core courses.

METCO participants also have classes with narrower skill distributions (see Panel B of Table 9). The gap between the 90th and 10th percentile of lagged classmate is 0.035 SD smaller in math and 0.240 SD in English. Similar patterns appear in elementary, middle, and high school. These estimates indicate that METCO students are placed in classrooms with more homogenous prior achievement levels.

7.5 Special education

METCO increases the likelihood of special education classification by approximately two percentage points annually (Appendix Figure 5). This increase is driven by placements in full-inclusion settings rather than more restrictive classrooms. The interpretation of this result is ambiguous: increased classification may improve access to services but could also carry stigma or lower expectations.

8 Heterogeneity

METCO's impacts are largest for students whose parents did not graduate from college. Table 10 shows that these students experience large and significant gains in 10th grade math and English exam scores, attendance, and suspensions. Their peers with at least one college-educated parent do not have gains in 10th grade math and English – the estimates are not statistically significant. Effects for suspensions and attendance are similar across the two groups.

METCO increases four-year college aspirations by 17 percentage points and four-year college enrollment by 20 percentage points for students whose parents did not graduate from college. Attending the suburban schools also increases enrollment in highly competitive colleges by 3.2 percentage points. METCO increases four-year college graduation of first-generation college students by 15 percentage points.

The effects for students with at least one college-educated parent are not as strong. The impacts on four-year college aspirations and enrollment are over a third smaller for those who have a college-educated parent. METCO does not have a statistically significant impact on these students enrolling in highly competitive colleges. There is no significant difference in the likelihood they graduate college within six years.

Column 3 of Table 10 shows that applicants with and without college-educated parents have substantially different counterfactuals. For applicants with college-educated parents, participating in METCO does not place them in peer groups with higher college expectations than they would have had otherwise. In contrast, 55 percent of applicants whose parents did not graduate college aspire to go to a four-year college if they don't participate in METCO. METCO therefore exposes first-generation students to sub-

stantially stronger college-going norms than they would otherwise experience, which may help explain the larger impacts on college attainment.

Table 10 also reports heterogeneity by gender. Boys have lower counterfactual academic outcomes than girls (Column 1). For example, girls who don't participate in METCO are about 20 percentage points more likely to aspire to, enroll in, and graduate four-year college than boys who do not participate. Boys also experience larger gains from METCO participation, particularly for test scores, college aspirations, and four-year college enrollment enrollment, though the difference in gender effects are generally not statistically distinguishable. The finding that boys experience larger gains from enrolling in a school in a wealthier neighborhood is consistent with Chetty and Hendren (2018) which finds boys are negatively impacted the most by highly segregated neighborhoods and Autor et al. (2019) which finds that family disadvantages harm boys' outcomes more than girls.

Black and Latinx students have lower counterfactual outcomes and experience larger gains than students of other racial groups. Taken together, the heterogeneity results suggest that the benefits are largest for students who would otherwise have the lowest levels of academic achievement.

The impacts of the program are similar for districts that are relatively closer and farther from Boston. On average, effects do not vary by estimating the impact of district value-added and distance to school on high school and college graduation using a 2SLS strategy similar to (Angrist et al., 2022). I instrument for district value-added and distance to the district with interactions of METCO offers and distances to the suburban districts, as well as interactions with district value-added and offers. District value-added has a substantial positive effect on college aspirations, high school graduation, and four-year college graduation.[33] In comparison, distance has effects close to zero across outcomes. These results suggest that distance to the districts did not substantially detract from students' long-run outcomes.

Impacts are also similar across districts with different levels of METCO enrollment and integration supports, suggesting that common features of the program and higher district value-added rather than district-specific factors, drive the results.

[33]Unlike the other outcomes, the estimate for college enrollment district value-added is no longer statistically significant when distance is included in the model, but the coefficient on distance is small and positive.

9 Conclusion

Over 70 years following the Supreme Court's *Brown v. Board* decision, school segregation persists in the United States. The problem has grown since the late 1980s and is linked to racial and socioeconomic inequities in school resources and achievement. School choice policy is a key policy lever to address these inequities. By studying METCO we learn about a high-profile integration policy as well as the effects of dramatically increasing school quality while holding home neighborhood fixed. The findings are relevant to the growing number of inter-district school choice programs as well as the 12 other voluntary inter-district school integration programs including East Palo Alto, Omaha, St. Louis, Minneapolis, Milwaukee, New Haven, Hartford, and Rochester.

From 2017 to 2020 alone, 45 districts launched integration programs (Potter and Burris, 2020). School integration received renewed focus following the murder of George Floyd in 2020. President Biden launched the Fostering Diverse Schools Demonstration Grants Program to fund school integration work and some of the country's largest school districts, including New York City, Los Angeles, Miami-Dade, Dallas, Milwaukee, Philadelphia, and Oakland, formed a collaborative effort support their integration work (Belsha and Darville, 2020).

Comparing this study's findings to those of other integration programs can help explain which aspects of school choice programs generate large effects. Participating in METCO leads to a large increase in district value-added, smaller class sizes, higher performing teachers and peers, more experienced teachers, better guidance counselor-to-student ratios, and higher expectations of college enrollment. Shifts in school and peer characteristics are typically smaller in within-district programs because the majority of school segregation, and the concurrent resource differentials, stem from across district differences (Clotfelter, 1999; Reardon et al., 2000; Logan et al., 2004, 2008). This explains why Angrist et al. (2022), Cullen et al. (2006) and Cordes et al. (2022) find that within-district choice in Boston, Chicago, and New York–which led to relatively small shifts in quality compared to METCO–did not impact test scores or college enrollment. Within-district choice has increased test scores, advanced course taking, college enrollment, and college attainment and reduced crime when the school quality change is larger like in Charlotte-Mecklenburg (Deming et al., 2014; Deming, 2011; Hastings and Weinstein, 2008) and Los Angeles (Campos and Kearns,

2023).

Boston charter schools cause a large improvement in test scores, but minimal changes in peer characteristics (Angrist et al., 2013). Compared to the METCO program, enrolling in a Boston charter school leads to smaller changes in district resources and peer characteristics, which may explain why Boston charter schools increase college going and graduation by a lesser amount than the METCO program.[34]

This study's findings are in line with the court-ordered desegregation literature which finds positive effects for Black students for high school graduation rate (Guryan, 2004; Reber, 2010), college quality, and earnings Johnson (2011, 2019). These instances of integration led to large shifts in school resources, a common thread among high impact integration policies Johnson (2011, 2019). Mantil (2022) finds those with METCO offers graduate high school and enroll in college 13 percentage points more than applicants without offers after controlling for 8th grade test scores and demographics for three cohorts. Bergman (2018) results differ from those of this study: the program also boosts English test scores by 0.2 SD, but does not change math scores. He finds no effect on four-year college enrollment and an increase in two-year college enrollment by six percentage points. Students are four percentage points more likely to remain enrolled in three or more semesters of college, which makes the impact on degree attainment likely small. Differences in the shift of district, peer, and participant characteristics in this program compared to METCO could potentially explain why the impacts differ between the two studies.

I find that METCO increases academic achievement, four-year college aspirations, college enrollment, college completion, and adult earnings. These effects are particularly large for students whose parents did not graduate from college. Although the estimated effects apply to METCO applicants rather than all Boston students, applicants come from a wide range of neighborhoods, family structures, and socioeconomic backgrounds, though immigrant families and English learners are underrepresented.

The evidence points to several mechanisms. METCO shifts students into districts with substantially higher value-added, exposes them to higher-achieving peers, and places them in school environments where college attendance is the norm. At the same time, participants are more likely to be placed in lower-achieving classrooms within schools that are less likely to enroll in AP courses despite greater availability.

[34] Angrist et al. (2016); Davis and Heller (2019); Cohodes and Pineda (2024) find that charter schools increase four-year college enrollment by eight to 13 percentage points and four-year college graduation by 4.6 percentage points.

These patterns suggest that METCO's impacts arise despite important barriers to full access to the most rigorous academic opportunities. The results also suggest that large improvements in school quality can substantially increase educational attainment and economic mobility without requiring families to move neighborhoods.

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Table 1: Descriptive Statistics of Boston and Suburban Fifth Graders

	Applicants (1)	Non-Applicants in Boston Public Schools (2)	Participants (3)	Suburban Peers (4)	Applicants Enrolled in Boston Public Schools (5)	Applicants Enrolled in Charter Schools (6)
Panel A: Demographics						
Female	0.498	0.486	0.548	0.493	0.470	0.495
Black	0.730	0.368	0.784	0.031	0.667	0.781
Latino/a	0.203	0.415	0.163	0.066	0.258	0.202
Asian	0.038	0.086	0.035	0.103	0.042	0.007
White	0.010	0.115	0.001	0.767	0.014	0.003
Disability that may affect bus needs	0.024	0.034	0.012	0.033	0.041	0.015
Participation in pre-K	0.264	0.231	0.216	0.139	0.292	0.340
Immigrant	0.020	0.170	0.018	0.043	0.030	0.019
Panel B: Outcomes & Classifications						
Economically disadvantaged	0.587	0.742	0.479	0.100	0.708	0.613
Special education	0.282	0.244	0.316	0.194	0.290	0.208
English learner (EL)	0.065	0.305	0.037	0.038	0.105	0.081
Suspension rate	0.079	0.048	0.025	0.007	0.066	0.206
Attendance rate	0.947	0.918	0.956	0.955	0.932	0.959
Math exam	-0.323	-0.429	-0.302	0.449	-0.424	-0.192
English exam	-0.292	-0.539	-0.181	0.447	-0.461	-0.219
Students	11,059	49,203	3,661	147,227	3,344	1,795
Panel C: Characteristics at Birth						
Infant weight (grams)	3,212	3,243	3,232	3,399	3,191	3,200
Parents married	0.376	0.401	0.449	0.917	0.316	0.333
Absent father	0.243	0.267	0.172	0.019	0.309	0.246
Government paid for birth	0.525	0.635	0.409	0.082	0.604	0.559
Mother's highest level of education						
Less than high school	0.124	0.275	0.066	0.021	0.178	0.091
High school degree	0.365	0.402	0.300	0.113	0.401	0.402
Some college	0.232	0.134	0.247	0.108	0.213	0.245
2-year college degree	0.103	0.054	0.136	0.069	0.077	0.115
4-year college degree or more	0.173	0.135	0.249	0.689	0.129	0.146
Father's highest level of education						
Less than high school	0.067	0.212	0.048	0.021	0.093	0.068
High school degree	0.336	0.453	0.332	0.151	0.390	0.393
Some college	0.149	0.120	0.181	0.103	0.137	0.157
2-year college degree	0.074	0.050	0.088	0.045	0.058	0.095
4-year college degree or more	0.148	0.166	0.197	0.679	0.124	0.137
Students with birth records data	12103	29364	2937	110062	6797	3435

Notes: Data is unique at the individual student level and contains students who attended 5th grade from the 2005-06 school year to the 2018-19 school year. Economically disadvantaged is defined by the Massachusetts Department of Elementary and Secondary Education for those that qualify for free or reduced price lunch from 2000 – 2014. In subsequent years, it is defined as those who participate in at least one of the following state programs: the Supplemental Nutrition Assistance Program (SNAP), the Transitional Assistance for Families with Dependent Children (TAFDC), the Department of Children and Families' (DCF) foster care program, or MassHealth (Medicaid). Disabilities that may affect bussing needs include physical, autism, emotional, intellectual, multiple disabilties, sensory (hearing or vision), neurological, and developmental delay disabilities. Disability identification may vary by the school a student enrolls in. Only students born in Massachusetts have birth record data. Test scores are centered using the state mean and standard deviation for the given grade level and year. Applicants include those who applied before 1st grade enrollment. Non-applicants in BPS include those that never applied to METCO.

Table 2: Balance of Offer Status and Participation Status

	Grade K or Grade 1 Offers		Grade K - Grade 10 Offers		Participation in Any Grade	
	Non-offered Mean	Difference	Non-offered Mean	Difference	Non-Participant Mean	Difference from Participants
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Student Traits						
Disability that may affect	0.017	-0.006**	0.017	-0.007***	0.021	-0.012***
bus needs		(0.003)		(0.002)		(0.002)
Immigrant	0.021	-0.005	0.019	0.001	0.215	-0.184***
		(0.003)		(0.002)		(0.005)
Attended public pre-K	0.303	-0.017*	0.310	-0.005	0.262	0.016***
		(0.009)		(0.008)		(0.006)
	11,829	14,910	9,755	14,910	122,175	128,517
Panel B: Neighborhood & Census block group demographics						
Dorchester	0.398	-0.006	0.398	-0.013		
		(0.010)		(0.008)		
Roxbury	0.145	-0.004	0.142	0.004		
		(0.007)		(0.006)		
Mattapan & Roslindale	0.169	0.011	0.168	0.008		
		(0.008)		(0.007)		
% high school graduate	0.269	0.000	0.269	-0.001		
		(0.003)		(0.002)		
% college graduate	0.183	-0.003	0.184	-0.002		
		(0.002)		(0.002)		
% homeowner	0.357	0.025***	0.353	0.026***		
		(0.005)		(0.004)		
% single parent	0.539	0.005	0.538	0.003		
		(0.007)		(0.006)		
Median gross rent	1410.235	0.264	1407.947	11.873		
		(12.230)		(10.144)		
% receipting SNAP or	0.289	-0.008**	0.290	-0.010***		
public assistance income		(0.004)		(0.003)		
N	11,587	14,639	9,533	14,639		
Panel C: Birth Certificate Data						
Apgar 5	8.808	-0.001	8.806	0.005	8.833	0.029**
		(0.016)		(0.013)		(0.013)
Infant weight (grams)	3205.869	20.137	3211.540	-0.324	3246.392	39.477***
		(14.434)		(12.170)		(8.892)
Parents married at birth	0.383	-0.017	0.389	-0.024**	0.417	0.108***
		(0.011)		(0.009)		(0.007)
Absent father at birth	0.229	-0.027***	0.227	-0.018**	0.229	-0.128***
		(0.010)		(0.008)		(0.006)
Government paid for birth	0.520	-0.066***	0.527	-0.063***	0.609	-0.243***
or prenatal medical care		(0.012)		(0.010)		(0.007)
N	8,874	11,417	7,248	11,417	68,278	73,497
Mother's highest level of education						
High school degree	0.348	-0.033***	0.351	-0.040***	0.380	-0.116***
		(0.011)		(0.009)		(0.007)
Some college	0.230	0.006	0.226	0.012	0.147	0.067***
		(0.010)		(0.008)		(0.005)
2-year college degree	0.114	0.000	0.113	0.003	0.070	0.059***
		(0.007)		(0.006)		(0.004)
4-year college degree or mc	0.212	0.043***	0.213	0.039***	0.179	0.149***
		(0.010)		(0.008)		(0.005)
N	8,877	11,420	7,251	11,420	67,628	72,847
Father's highest level of education						
High school degree	0.321	0.004	0.322	-0.008	0.424	-0.156***
		(0.011)		(0.009)		(0.007)
Some college	0.142	0.014*	0.139	0.014**	0.125	0.017***
		(0.008)		(0.007)		(0.005)
2-year college degree	0.083	0.005	0.082	0.007	0.063	0.025***
		(0.007)		(0.006)		(0.004)
4-year college degree or	0.171	0.010	0.172	0.013*	0.207	0.066***
more		(0.009)		(0.007)		(0.006)
N	8,877	11,420	7,251	11,420	52,575	57,794
F-stat		3.319		5.186		
P-value		0.00		0.00		

Notes: This table shows the differences across offer and participation status. Regressions of traits on METCO offer receipt for Kindergarten or first grade (Column 2) or any grade (Column 4) control for race, gender, linear and quadratic age of application, and the years that applicants are in the offer pool. The sample for Columns 1 through 4 includes those who applied before first grade and excludes those with siblings already in the METCO program. Column 6 shows analogous results for the sample of students that ever attend BPS or participate in METCO. The sample includes those who attended primary or secondary school between 2001 and 2020. Columns 3 to 6 include students who applied in any grade and Columns 1 to 2 restricts to those who applied before grade 1. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 3: 2SLS Effects of METCO on Standardized Test Scores, Attendance, and Suspensions

	Non-METCO 3rd Grade Mean	Grade-level 3	4	5	6	7	8	9	10	11	12
Effect of any offer on participating in METCO											
Participation		0.667***	0.664***	0.656***	0.645***	0.627***	0.633***	0.603***	0.590***	0.584***	0.507***
		(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)
Two-Stage Least Squares Results: Impact of METCO Enrollment											
Math	-0.403	0.118***	0.133***	0.121***	0.048	0.054	0.091**		0.132***		
	(1.059)	(0.035)	(0.033)	(0.035)	(0.033)	(0.034)	(0.035)		(0.044)		
N	7146	9008	8835	8172	8500	7858	7176		5486		
F-Stat		478	462	377	390	320	281		137		
P-Value		0.000	0.000	0.000	0.000	0.000	0.000		0.000		
English	-0.390	0.191***	0.204***	0.162***	0.135***	0.141***	0.180***		0.211***		
	(1.055)	(0.033)	(0.034)	(0.036)	(0.033)	(0.034)	(0.036)		(0.042)		
N	7612	9556	8830	8176	8517	7874	7188		5521		
F-Stat		533	457	374	389	319	280		136		
P-Value		0.000	0.000	0.000	0.000	0.000	0.000		0.000		
Attendance	0.907	0.026***	0.029***	0.024***	0.027***	0.020***	0.027***	0.051***	0.049***	0.044***	0.044***
rate	(0.176)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)	(0.007)	(0.009)	(0.009)	(0.009)
N	8868	11020	10379	9757	9609	9002	8232	7430	6474	5489	4916
F-Stat		581	499	426	424	347	302	255	151	193	178
P-Value		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suspended	0.050	-0.028***	-0.052***	-0.068***	-0.042***	-0.034***	-0.036***	-0.047***	-0.021	-0.013	-0.018
	(0.217)	(0.006)	(0.007)	(0.009)	(0.011)	(0.012)	(0.013)	(0.013)	(0.015)	(0.014)	(0.012)
N	8868	11020	10379	9757	9609	9002	8232	7430	6474	5489	4916
F-Stat		581	499	426	424	347	302	255	151	193	178
P-Value		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: The first row shows the effect of getting an offer to any METCO district by a grade-level on whether the student participates in METCO in that grade. Subsequent rows report the 2SLS estimates of the impact of METCO participation in each grade on test score and behavioral outcomes. METCO enrollment in that specific grade is the endogenous variable. The instrumental variables are individual school district METCO offers. Controls include race, gender, application age (linear and squared), neighborhood, indicators for the grade and year combinations students were in the applicant pool, English Learner status, immigrant status, and special education status that may require specialized bussing. The sample includes students that entered first grade between 2003 and 2020, applied before the first grade, are old enough to have reached the grade-level of the exam, and do not have sibling preference. Standard deviations are in parentheses in the first column and standard errors are in parentheses in other columns. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 4: 2SLS Effects of METCO on College Preparation

	Non-METCO mean (1)	2SLS Estimate (2)	Standard Error (3)	N (4)	F-Stat (5)	P-Value (6)
Panel A: High School Graduation						
Dropout	0.060	-0.043***	(0.008)	5650	514	0.000
Graduate in 4 years	0.697	0.175***	(0.015)	5650	514	0.000
Graduate in 5 years	0.742	0.144***	(0.014)	5650	514	0.000
Panel B: Testing						
Meets standardized testing high school graduation requirement	0.696	0.060***	(0.017)	4247	468	0.000
Qualify for Adams scholarship	0.208	-0.122***	(0.014)	4254	470	0.000
Take SAT	0.502	0.151***	(0.016)	5650	514	0.000
SAT 800 or higher	0.401	0.146***	(0.017)	5650	514	0.000
SAT 1000 or higher	0.200	0.080***	(0.014)	5650	514	0.000
SAT 1200 or higher	0.062	0.020**	(0.008)	5650	514	0.000
SAT 1400 or higher	0.014	0.002	(0.004)	5650	514	0.000
Took AP	0.325	-0.070***	(0.016)	5650	514	0.000
Number of APs	0.970	-0.343***	(0.057)	5650	514	0.000
AP Score Above 3	0.150	-0.009	(0.012)	5650	514	0.000
AP Score 4 or 5	0.085	-0.004	(0.009)	5650	514	0.000
Panel C: Post High School Aspirations						
Any college	0.728	0.119***	(0.015)	4832	472	0.000
2-year college	0.171	-0.056***	(0.013)	4832	472	0.000
4-year college	0.558	0.175***	(0.018)	4832	472	0.000

Notes: This table reports the 2SLS estimates of the impact of ever participating in METCO on high school outcomes. All models use individual school district METCO offers as instrumental variables. See Table 3 notes for the full list of control variables. The sample includes those who entered the first grade betwen 2003 and 2011 and enrolled at least one year in public high school in Massachusetts. The graduation requirement, qualifying for Adams scholarship, and post high school aspirations sample only includes those who took the 10th grade exams and survey. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 5: 2SLS Effects on College Outcomes

	Non-METCO mean (1)	2SLS Estimate (2)	Standard Error (3)	N (4)	F-Stat (5)	P-Value (6)
Panel A: Racial Composition of College						
Percent Black or Latinx	0.303	-0.012	(0.008)	4129	521	0.000
Percent Non-White	0.527	-0.011	(0.008)	4129	521	0.000
Percent Attend historically Black college or university	0.026	0.028***	(0.005)	10476	1277	0.000
Panel B: College Enrollment						
Any college	0.659	0.186***	(0.011)	12083	1493	0.000
2-year college	0.256	-0.011	(0.011)	12083	1493	0.000
4-year college	0.451	0.221***	(0.012)	12083	1493	0.000
4-year public	0.195	0.072***	(0.010)	12083	1493	0.000
4-year private	0.261	0.166***	(0.011)	12083	1493	0.000
4-year public in MA	0.131	0.047***	(0.008)	12083	1493	0.000
Panel C: 4-year College Ranking						
Most competitive	0.027	0.009**	(0.004)	12083	1493	0.000
Highly competitive	0.063	0.023***	(0.006)	12083	1493	0.000
Very competitive	0.132	0.037***	(0.008)	12083	1493	0.000
Competitive	0.389	0.189***	(0.012)	12083	1493	0.000
Panel D: 4-year College Persistence+						
One academic semester	0.388	0.186***	(0.012)	12083	1493	0.000
Three academic semesters	0.342	0.177***	(0.012)	12083	1493	0.000
Five academic semesters	0.300	0.167***	(0.011)	12083	1493	0.000
Seven academic semesters	0.262	0.150***	(0.011)	12083	1493	0.000
Panel E: College Graduation within 6 Years+						
Any	0.262	0.124***	(0.011)	12083	1493	0.000
2-year college	0.041	-0.006	(0.005)	12083	1493	0.000
4-year college	0.232	0.130***	(0.010)	12083	1493	0.000

Notes: This table reports the 2SLS estimates of the impact of ever participating in METCO on college enrollment, persistence, and graduation. The sample includes all applicants who were projected to graduate high school in 2006 through 2017. All models use individual school district METCO offers as instrumental variables. See Table 3 notes for the full list of control variables. Racial composition of college refers to the first college students enrolled in and is missing if the student did not enroll in college within two years of their projected high school graduation date. College competitiveness comes from Barron's rankings based on admissions rates. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6: 2SLS Effects on Labor Market Outcomes

	Full Balanced Panel Sample				Ever Appears in Labor Data				Has Non-Missing Wages for Age	
	Annual Income in MA		Employed in MA		Annual Income in MA		Employed in MA		Annual Income in MA	
Age	Non-METCO Mean	2SLS	Non-METCO Mean	2SLS	Non-METCO Mean	2SLS	Non-METCO Mean	2SLS	Non-METCO Mean	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
25	7,623	7,708**	0.349	0.228***	11,923	5,786**	0.546	0.119***	21,841	4,980**
		(1330)		(0.037)		(1,551)		(0.036)		(2,068)
30	16,105	14,091**	0.489	0.164***	25,190	10,001**	0.765	-0.010	32,936	12,757**
		(2304)		(0.041)		(2,639)		(0.037)		(2,792)
35	18,272	16,250**	0.450	0.164***	28,578	11,854**	0.705	0.014	40,559	16,041**
		(2827)		(0.042)		(3,281)		(0.041)		(3,738)
N	1,636	2,174	1,636	2,174	1,046	1,498	1,046	1,498	737	1,063
F-Stat		1183		1183		984		984		698
P-Value		0.000		0.000		0.000		0.000		0.000

Notes: This table reports the 2SLS estimates of the impact of ever participating in METCO on earnings and employment in Massachusetts. The instrument is whether the student received any METCO offer. See Table 3 notes for the full list of control variables. The sample includes those who are 35 or older (entered first grade in 1991 through 1994) and have matched to state administrative education data. Annual income is set to zero if someone has no earnings for each of the quarters in a year or does not appear in the Massachusetts Department of Unemployment Assistance data. Those with federal, military, or out of state jobs are not included in the data. Earnings from self-employment are also not included in the data. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 7: Family Fixed Effects

Outcome	Non-METCO mean	Endogenous Variable: Ever Participate in METCO			Endogenous Varible: Ever Offered METCO		
		Estimate	Standard Error	N	Estimate	Standard Error	N
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: K-12 Outcomes							
5th Grade Math Score	-0.284	0.137*	(0.076)	549	0.131**	(0.062)	777
5th Grade English Score	-0.303	0.211***	(0.079)	552	0.191***	(0.061)	784
5th Grade Attendance Rate	0.923	0.020***	(0.008)	1120	0.025***	(0.007)	1517
5th Grade Suspension Rate	0.096	-0.044**	(0.018)	905	-0.012	(0.016)	1275
10th Grade Math Score	-0.303	0.140**	(0.055)	976	0.092*	(0.049)	1137
10th Grade English Score	-0.279	0.306***	(0.053)	996	0.190***	(0.048)	1165
10th Grade Attendance Rate	0.859	0.048***	(0.011)	1229	0.033***	(0.010)	1479
10th Grade Suspension Rate	0.147	-0.037	(0.023)	1071	-0.021	(0.020)	1325
Graduate high school in 4 years	0.641	0.282***	(0.027)	996	0.145***	(0.026)	1205
Graduate in 5 years	0.690	0.256***	(0.026)	996	0.136***	(0.025)	1205
Panel B: College Preparation Outcomes							
Meets graduation requirement	0.678	0.115***	(0.037)	633	0.065**	(0.033)	737
Qualify for Adams scholarship	0.198	-0.057**	(0.023)	634	0.010	(0.024)	741
Take SAT	0.517	0.215***	(0.031)	966	0.143***	(0.028)	1180
SAT 800 or higher	0.365	0.196***	(0.029)	966	0.138***	(0.026)	1180
SAT 1000 or higher	0.164	0.070***	(0.020)	966	0.037**	(0.018)	1180
Took AP	0.274	-0.015	(0.023)	876	-0.001	(0.023)	1072
Panel C: College Outcomes							
Apire to college	0.713	0.178***	(0.029)	810	0.094***	(0.029)	915
Aspire to 4-year college	0.520	0.248***	(0.033)	810	0.136***	(0.031)	915
Enroll in any college	0.633	0.259***	(0.023)	1461	0.165***	(0.021)	1830
Enroll in 4-year college	0.431	0.248***	(0.024)	1461	0.141***	(0.022)	1830
Enroll in highly competitive college	0.063	0.021	(0.013)	1461	0.018	(0.011)	1830
Enroll in very competitive	0.127	0.056***	(0.018)	1461	0.049***	(0.016)	1830
Enroll in competitive college	0.378	0.200***	(0.025)	1461	0.123***	(0.022)	1830
Complete one academic semester	0.360	0.200***	(0.025)	1461	0.111***	(0.022)	1830
Complete three academic semesters	0.314	0.190***	(0.024)	1461	0.122***	(0.021)	1830
Complete five academic semesters	0.272	0.183***	(0.023)	1461	0.125***	(0.020)	1830
Complete seven academic semesters	0.237	0.164***	(0.021)	1461	0.123***	(0.019)	1830
Graduate from college within 6 years	0.237	0.121***	(0.022)	1461	0.089***	(0.019)	1830
Graduate 4-year college within 6 years	0.209	0.120***	(0.020)	1461	0.098***	(0.018)	1830
Panel D: Earnings							
Income at age 25	12111	7,780***	(1150)	1401	724	(3347)	1726
Income at age 30	13664	17,659***	(3649)	457	12,087***	(2188)	553

Notes: This table displays the OLS and intent to treat estimates with family fixed effects. The sample includes families where at least two children applied and at least one was offered a METCO seat and at least one was not. Columns 2 through 4 use an indicator for whether the student ever participated in METCO as the endogenous variable. Columns 5 through 7 display the intent to treat estimates: ever receiving a METCO offer is the endogenous variable. Estimates for college outcomes restrict to the set of applicants who have reached six years past their projected high school graduation date. Analysis of high school outcomes restrict to those who have reached age 18 or older. Fifth and tenth-grade estimates restrict to those who are old enough to have completed those grade levels in the data. College results include those who went to private school and out-of-state schools for K-12. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 8: District Value-Added

	Non-METCO VA Mean	METCO Effect on District Value-Added of Outcome	Multiple Endogenous Variable Model: Effect of District VA on Outcome	Multiple Endogenous Variable Model: Effect of Distance to District on Outcome	Actual Outcome - Predicted Outcome using District VA and Covariates
	(1)	(2)	(3)	(4)	(5)
Aspire to 4-year College	0.54	0.688***	0.305***	0.000	0.08
		(0.022)	(0.042)	(0.002)	
N		6027		3402	967
Graduate HS within 5 years	-2.27	1.910***	0.048***	0.001	0.03
		(0.066)	(0.011)	(0.001)	
N		6027		3487	1042
Enroll in 4-year college	0.43	0.353***	-0.007	0.010***	0.07
		(0.020)	(0.055)	(0.002)	
N		6027		3945	897
Graduate from 4-year college	0.21	0.918***	0.122***	0.000	0.15
		(0.022)	(0.040)	(0.002)	
N		6027		2941	897

Notes: This table displays district value added estimations. District value-added is calculated on the sample of public schools in Massachusetts that enroll students in at least 1st through 12th grade. Regional high school districts (e.g., Lincoln-Sudbury) are included and the K-8 districts that send students to their high school (e.g., Lincoln and Sudbury) are counted as within the regional high school district for the estimation. Non-METCO students who enrolled in the district in 1st grade and 9th grade and are projected to graduate high school in 2015 or later are included in the district's value-added estimations. This time-range restriction ensures that students in the sample are old enough to have first grade and college graduation otucomes. District-value added is calculated in a random effects model that controls for student baseline demographics, special education and English learner status and services, parental education, health at birth, family structure, Medicaid receipt, and projected high school graduation year. Each district has one value-added estimate. Estimates are centered related to the state mean and standard deviation. District-value added estimates are highly correlated to alternative specifications which include district fixed effects instead of random effects, third grade test score controls, and excluding birth data control variables. Column 2 displays the 2SLS estimates of the impact of METCO participation on the district value-added of students in 9th grade. See Table 3 notes for the full list of control variables. Columns 3 and 4 display the coefficients on district value-added and distance from Boston to the center of the school district in a multiple endogenous variable 2SLS model that uses METCO district offers interacted with the distance to each METCO district and each METCO district's value-added. The model includes the control variables listed in Table 3 notes and the sample is restricted to students who are projected to graduate after 2015. Column 5 reports the difference between actual outcomes of students who participated in METCO and their predicted outcomes based on a model with district value-added and the full set of covariates used in the district value-added estimation. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 9: 2SLS Effects on Classroom Characteristics

	Non-METCO mean (1)	2SLS Estimate (2)	Standard Error (3)	N (4)
Panel A: Classmate traits (lagged)				
Math score	-0.347	0.560***	(0.010)	57023
English score	-0.376	0.614***	(0.010)	57010
Attendance rate	0.901	0.030***	(0.001)	85052
Suspension rate	0.123	-0.065***	(0.002)	85052
% Low income	0.527	-0.499***	(0.004)	86317
% White	0.250	0.477***	(0.004)	86317
% Black or Latinx	0.653	-0.550***	(0.005)	86317
% Special education	0.257	0.039***	(0.004)	86317
% English Learner	0.102	-0.096***	(0.003)	86317
Panel B: Tracking				
Difference between lagged average test scores of class' and the grade's				
Math	-0.088	-0.393***	(0.009)	45206
English	-0.041	-0.188***	(0.008)	45213
Lagged average test scores of class are below the grade average				
Math	0.547	0.226***	(0.009)	45206
English	0.477	0.165***	(0.009)	45213
90th - 10th percentile of lagged scores				
Math	1.627	-0.035***	(0.009)	57023
English	1.782	-0.240***	(0.010)	57010
Panel C: Course offerings				
# of AP courses	15.481	8.217***	(0.403)	6061
# of foreign languages	2.938	1.820***	(0.068)	6061
# of arts course categories	2.725	0.575***	(0.033)	6061
Average class size	21.477	-3.369***	(0.235)	86317
Panel D: Student course-taking (in years)				
Math	3.877	0.030**	(0.014)	4072
Science	3.565	0.091***	(0.023)	4072
Foreign language	2.314	0.390***	(0.045)	4072
Arts	1.550	0.501***	(0.050)	4072
Panel E: Teacher traits				
Average teacher salary	89190	3,652***	(589)	6898
Average spending per pupil	19761	-438***	(132)	6382
Average students per guidance counselor	287	-154***	(12)	7114
% novice teachers (<2 years)	0.194	-0.074***	(0.011)	7690
% Black or Latinx teachers	0.245	-0.191***	(0.011)	7690
Average VAM for non-METCO students	-0.199	0.170***	(0.035)	4386

Notes: This table reports the 2SLS estimates of the impact of participating in METCO in 9th grade on classroom, school, and teacher characteristics. The instruments are individual school district METCO offers. See Table 3 notes for the full list of control variables. Panel A uses the average of the classroom averages for individual applicants' core subjects. Each classroom average comes from the one-year lag of the characteristic except for average class size. The first two outcome variables in Panel B exclude classes that are smaller than five students, as well as school-grade-year-subject combinations where there is only one class (e.g., only one English class in that grade). Value-added measure is for math and English classes and calculated following Chetty, Friedman, and Rockoff (2014). Standard errors are in

Table 10: Subgroup Analysis

	Difference in Non-METCO Means			2SLS Estimates					
	Male - Female (1)	Black/Latinx - White/Asian (2)	No college - college (3)	Male (4)	Female (5)	Black or Latinx (6)	White or Asian (7)	Neither parent a college grad (8)	Parent college grad (9)
10th grade Math exam	-0.156	-0.332	-0.326	0.187***	0.092***	0.148***	0.093*	0.099***	-0.057
				(0.030)	(0.026)	(0.020)	(0.049)	(0.028)	(0.045)
N				5731	6035	11289	2249	5671	2019
10th grade English exam	-0.387	-0.264	-0.310	0.287***	0.172***	0.240***	0.149***	0.155***	0.028
				(0.030)	(0.024)	(0.020)	(0.046)	(0.027)	(0.040)
N				5790	6069	11380	2268	5712	2031
10th grade attendance rate	-0.011	-0.017	-0.013	0.062***	0.036***	0.050***	0.037***	0.040***	0.024***
				(0.006)	(0.005)	(0.004)	(0.009)	(0.005)	(0.008)
Suspended in 10th grade	0.074	0.028	0.046	-0.036***	-0.023**	-0.031***	-0.025	-0.034***	-0.028*
				(0.013)	(0.010)	(0.008)	(0.017)	(0.011)	(0.015)
N				6093	6135	11728	2425	6045	2148
Take SAT	-0.119	-0.097	-0.043	0.178***	0.128***	0.149***	0.163***	0.146***	0.131***
				(0.014)	(0.013)	(0.010)	(0.023)	(0.014)	(0.022)
SAT 1000 or higher	-0.038	-0.124	-0.106	0.060***	0.045***	0.050***	0.097***	0.058***	0.039*
				(0.010)	(0.010)	(0.007)	(0.020)	(0.011)	(0.021)
N				7353	7240	14068	2676	6700	2361
4-year high school graduate	-0.100	-0.063	-0.060	0.205***	0.143***	0.175***	0.128***	0.150***	0.075***
				(0.014)	(0.010)	(0.009)	(0.019)	(0.011)	(0.015)
N				6410	6647	12553	2498	6274	2251
Aspire to 4-year college	-0.183	-0.119	-0.154	0.208***	0.171***	0.196***	0.111***	0.172***	0.098***
				(0.017)	(0.014)	(0.011)	(0.025)	(0.016)	(0.023)
N				4974	5545	10081	1993	5110	1856
4-year college enrollment	-0.153	-0.079	-0.149	0.232***	0.157***	0.197***	0.154***	0.186***	0.110***
				(0.022)	(0.020)	(0.015)	(0.031)	(0.019)	(0.028)
N				3852	3743	7224	1677	4188	1521
Enroll in a "highly competitive" college	-0.029	-0.062	-0.077	0.032***	0.019	0.025***	0.055***	0.029***	-0.025
				(0.011)	(0.012)	(0.008)	(0.021)	(0.010)	(0.021)
N				3852	3743	7224	1677	4188	1521
6-year college graduation 4-year college	-0.134	-0.105	-0.145	0.103***	0.146***	0.127***	0.166***	0.153***	0.058
				(0.022)	(0.024)	(0.017)	(0.037)	(0.022)	(0.041)
N				2345	2235	4350	980	2441	793

Notes: This table reports the 2SLS estimates of the impact of ever participating in METCO on high school and college outcomes by subgroups. The instruments are individual school district METCO offers. See Table 3 notes for the full list of control variables. Data include applicants who were projected to graduate high school in 2004 and later. College competitiveness comes from Barron's rankings based on admissions rates. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Online Appendix to

Busing to Opportunity? The Impacts of the METCO Voluntary School Desegregation Program on Urban Students of Color.

Elizabeth Setren

Updated June 2026

A Data Appendix

A.1 Matching process

Appendix Table 1 reports match rates between the application records and the administrative education and birth records data. Each row reflects one of the analysis samples. For example, those that enter first grade in the 2002-2003 through 2019-2020 school years have the full set of primary and secondary school outcomes while those who enter first grade in 1990-1991 through 1993-1994 have labor market outcomes for age 35 and college outcomes. The preferred specification restricts to students who applied before first grade and did not have sibling preference. Column 4 shows this sample size. Eighty-nine percent of the K–12 preferred specification sample appears in the administrative education data. This indicates that they attended a Massachusetts public school at some point between kindergarten and 12th grade. Most of the unmatched 11 percent of the sample attended either private or out-of-state school for their entire primary and secondary schooling. A small portion of the unmatched may have enrolled in Massachusetts public schools, but I was unable to confidently match them. This match rate is comparable to other matches of Boston residents to state education data. Applicants match to birth records data if they were born in Massachusetts, have an official birth certificate, and could be matched with confidence using the process described below.

Applicants with offers to participate in METCO by first grade are 5.8 percentage points more likely to match to the education data and 3 percentage points more likely to match to the Massachusetts birth records. Therefore, applicants without offers are slightly more likely to go to private or out-of-state schools. Accordingly, the estimates apply to the subset of applicants who enroll in Massachusetts public schools.

The match rate and differences by offer status are similar for the high school and college outcomes samples. Older cohorts have lower match rates in the education data because they entered school before state administrative data collection began in the 2001-2002 school year. As a result, there are fewer opportunities to observe them in the data. For example, a student who attended Massachusetts public elementary schools and subsequently moved out-of-state would appear in the administrative data if they were in first grade in 2003, but not if they were in first grade in 1993. Among applicants who are observed

through age 30, 76 percent match to education data and a 64 percent match to birth records. Match rates do not differ significantly by offer status. For the age 35 sample, 70 percent match to education data and a 59 percent match to birth records, with no statistically significantly different match rate across offer status.

Applicants were matched to administrative data using full name and date of birth. Names were standardized by removing special characters, spaces, and suffixes. All name and date of birth variants that appeared in the applicant records were considered. Exact matches on full name and date of birth were accepted automatically. Additional matches were identified using a series of deterministic rules, including exact agreement on first name, last name, date of birth, and middle initial; exact matches in which the middle name or initial was omitted; and cases in which the middle and last names were transposed. Reclink and dtalink were used to identify potential matches. Candidate matches were reviewed to identify recurring discrepancies, such as differences in the writing of hyphenated surnames, that could be incorporated into the matching code. For the education data, all remaining fuzzy matches were reviewed manually. For the birth-record data, only automated matching procedures were used, but more deterministic rules were developed from reviewing fuzzy match results.

A.2 Selection into the METCO applicant sample

Appendix Table 11 examines selection into METCO participation and the extent of bias in naïve Ordinary Least Squares (OLS) estimates of the program's effects. The simplest comparison contrasts the outcomes of students enrolled in METCO with those of students enrolled in Boston Public Schools and Boston charter schools. This type of aggregate comparison is typically what is available for policy reports and newspaper accounts of METCO. Column 1 shows that METCO students score 0.63 SD higher in math, 0.274 SD higher in English, have attendance rates that are three percentage points, and are 4.5 percentage points less likely to be suspended.

Next, Column 2 adds controls for gender and race. Under this specification, the positive association between METCO participation and test scores and the negative association with suspensions become larger. Because 95 percent of METCO students are Black or Latinx and these groups have lower average test

scores and higher suspension rates than their White and Asian peers in Boston Public Schools. Therefore, simple comparisons of Boston schools and METCO student outcomes understate METCO students' higher achievement because they do not adjust for race.

The collection and digitization of applicant records allow me to restrict the sample to METCO applicants and account for selection into the applicant pool. Applicants may differ from non-applicants in unobserved ways such as student motivation, parental engagement, or family resources. Restricting the sample to the 17 percent of Boston students who applied to METCO before first grade reduces the math, English, and attendance point estimates by more than 50 percent (see Column 3). Therefore, students who were pre-disposed to do better on the exams were more likely to participate in METCO. However, a substantial positive association between participating in METCO and academic and attendance outcomes remains. The types of students who apply to METCO cannot explain the association between METCO participation academic and behavioral outcomes.

Students who apply to METCO at a younger age may differ from those who apply later. For example, parents who apply during infancy may have greater resources or more time to invest in their child's education. Column 4 adds linear and quadratic controls for age at application in months. The estimates are nearly identical to those in Column 3, suggesting that application timing explains little of the remaining differences between METCO participants and comparison students.

Column 5 adds controls for disability status, English Learner status, and neighborhood indicators. The estimates change little relative to Column 4, suggesting that these characteristics explain little of the remaining differences between participants and non-participants.

The preferred specifications use district offers as instruments for METCO participation. These estimates identify the effects of participation for applicants whose enrollment decisions are affected by receiving an offer. Column 6 shows larger math effects than the corresponding OLS estimates, suggesting downward bias in the OLS estimates. Estimates for the remaining outcomes are similar across the two approaches.

Applicants with older siblings already enrolled in METCO have a higher likelihood of admission. Therefore, the offer instruments are not valid for children with older siblings because offer receipt is not plausibly random within this group. After excluding siblings from the analysis, Column 8 shows larger effects in

math and English and similar effects in attendance and suspensions. Next, Column 9 adds controls for application grade and the years during which students were eligible to receive offers, which reduces the English, attendance, and suspension estimates. Finally, I control for socioeconomic characteristics from the birth records: whether the child received adequate prenatal care, whether their parents were married when they were born, whether their parents were college educated, and whether they were on Medicaid at birth. Applicants who receive offers do not appear positively selected on these socioeconomic characteristics.

In sum, applicants to METCO appear positively selected relative to non-applicants, but there is little evidence of additional selection based on application timing or observable socioeconomic characteristics. Instrumental-variables estimates that use district offers to identify participation effects yield estimates that are broadly similar to OLS estimates among applicants. After accounting for selection into applying, METCO participation remains associated with higher test scores, improved attendance, and lower suspension rates. The preferred specifications indicate that METCO increases fifth grade math and English achievement by approximately 0.1 to 0.2 SD and reduces the likelihood of suspension by 3.0 to 7.2 percentage points.

A.3 Additional robustness

Later offers

Parents have more information about their child's academic ability as they progress through school. They may be more or less motivated to apply for METCO if their child has higher or lower test scores and grades. For this reason, the analysis sample only includes students who applied before first grade. Parents whose children are still on the waitlist after first grade may also update their interest in the program as they learn more about their child's academic performance and schooling experience. As a result, there is more potential for selection bias among those who receive offers after first grade. Defining the treatment variable as METCO participation in first grade and the instrumental variables as offer status for first grade participation avoids this concern by counting those who join METCO at an older grade as untreated. The estimates are similar with this specification.

Attrition

This section provides additional detail to Section 6.6's attrition discussion. Appendix Table 8 shows the tests for differential attrition by METCO offer status for the various outcomes in the data. The first three columns focus on students who appear at least once in the administrative education data and show whether there is differential attrition among those who ever enroll in Massachusetts public schools. The last three columns investigate attrition for the full sample of applicants. Column 1 shows that 95.5 percent of applicants without first grade offers have at least one year of elementary school outcomes. Those with offers have a 2.4 percentage point higher likelihood of having elementary school data (Column 2) and receiving a METCO offer leads to a 3.8 percentage point higher likelihood of having elementary school outcomes. The match rates for middle (87.5 percent) and high school (83.6 percent) outcomes are lower, but have comparable differential match rates across offer status. Labor market outcomes are only available for former Massachusetts public high school students. As such, they have the same attrition statistics for having high school outcomes.

Students may appear in the administrative education data, but be absent on testing days or may not attend a Massachusetts public school during a testing grade (tests are administered in grades 3 through 8 and grade 10). In these cases, students would have attendance, suspension, class taking, and class peer data for the years they are enrolled, but not test score outcomes. The next rows in Appendix Table 8 show that 80.7 percent of applicants who enroll at least one year in Massachusetts public schools have at least one elementary school exam outcome (i.e., for third, fourth, or fifth grade math or English). Applicants with METCO offers are five percentage points more likely to have an elementary school exam outcome, and receiving an offer increases the likelihood of having an elementary school test score by 8.3 percentage points. Middle school students have a slightly higher test-taking rate of 84.4 percent and less differential attrition (though the elementary and middle school estimates are not statistically significantly different). Unlike in elementary and middle school where there are three test-taking grades, high school only has one exam year. This contributes to the lower rates of test-taking outcomes for high school. Sixty-four percent of applicants without offers have a high school exam outcome. Applicants with offers are 7.7 percentage points more likely to have a high school test score, and METCO participation increases the likelihood of

having a high school test score by 11.6 percentage points.

The survey that asks students' plans for after high school is administered in the same year as the high school exam, and therefore has similar attrition and differential attrition. By the end of high school, a portion of students move out-of-state or to private school, so we cannot see their graduation outcomes. Over 72 percent of applicants without offers have four-year high school graduation outcomes and applicants with offers are eight percentage points more likely to have those outcomes observed. In all, Column 3 shows that not participating in METCO makes Massachusetts public school students more likely to leave the state public school system at some point in their K–12 years. As a result, they are less likely to have observed outcomes, with differences ranging from 3.8 percentage points for elementary school outcomes to 13.8 percentage points for plans to attend college.

Columns 4 through 6 show analogous results for the full sample, including the 11 percent of applicants who never enroll in Massachusetts public schools. Eighty-six percent of applicants that did not receive an offer appear in the state administrative data and contribute outcomes to the analysis. This is 5.8 percentage points lower than the match rate for those with offers. The difference in match rate across offer status is 7.9 percentage points for elementary school and 8.7 percentage points for middle school outcomes. Receiving a METCO offer increases the likelihood of having high school graduation outcomes by 14.0 percentage points. Therefore, METCO offers reduce attrition from K–12 outcomes data since applicants are both more likely to enroll in and remain enrolled in Massachusetts public schools.

I use the rich baseline characteristics to predict who will not match to the state administrative education data. I use applicants who do not receive offers to estimate the relationship between each baseline trait and attrition and then use that model to calculate a predicted likelihood of attrition in the full sample. Appendix Table 10 shows the effect of METCO participation estimated separately by predicted attrition likelihood. Estimated effects among applicants with the highest predicted attrition probabilities are similar to those in the full sample. This finding is robust whether most likely to attrit is defined as the top quartile or top decile of predicted attrition. Income at age 25 and 30 also have similar effect sizes for those most likely to attrit. Tenth grade math and English test score estimates are also similar for applicants who are predicted to be more likely to attrit and for the full sample. The earlier testing grades, particularly math

and middle school exams, are less robust to attrition concerns. However, estimates for those that are likely to attrit are generally positive and of similar magnitude to the full sample (with the exception of 6th grade math).

Appendix Table 9 shows the range of intent-to-treat effects using Lee bounds (Lee, 2009). The first two columns show the lower and upper bounds of the treatment effects in a simple model that tightens on age at the time of application (in years), whether the applicant is Black, and grade-cohort range (in four-year groups).[35] Similar to the predicted attrition exercise, the high school and college aspiration results are robust to attrition concerns.

The test score estimates, particularly math, are less robust to missing data (see Appendix Table 9 and Appendix Table 10). I cannot rule out a null or negative effect of METCO on test scores. Columns 3 and 4 restrict the sample to students who appear in public school data at least once and show positive bounds for English outcomes. Restricting to those whose parents did not graduate from college yields similar findings as the first four columns. Because test scores are noisy continuous measures, Lee bounds are less precise than for binary outcomes. To reduce noise, I also use a binary variable for test performance: whether the student meets proficiency status on their high school math or English exam. The Lee bounds estimates suggest we can rule out negative effects on English passing rates: estimated bounds range from approximately 0 to 13.2 percentage point increase in English proficiency. Lee bounds for math proficiency also the lower bound for Math: estimated bounds range from negative 4.4 percent to 21.2 percent impact on Math proficiency in the full sample and negative 0.01 percent to 13.8 percent in the sample of students that ever appear in a Massachusetts public school. These Lee bounds estimates allow me to rule out substantial negative effects for METCO participation on test scores.

While college outcomes are not subject to the same differential attrition concerns, Appendix Table 9 also shows Lee bounds for college outcomes. I assume that 30 percent of applicants without NSC data are missing because their institution does not report to the NSC or because of matching error, rather than because they did not enroll in college. Thirty percent overstates potential attrition because more than 90 percent of U.S. institutions are represented in NSC. The results of this exercise suggest that the

[35] Adding additional covariates creates cells without insufficient variation for estimation.

college results are robust to attrition concerns. Combined, these three approaches find that the high school graduation, dropout, SAT, and college outcomes are robust to attrition concerns.

Foote and Stange (2022) argue that Lee bounds are inappropriate for analyzing attrition for state administrative employment records because the bounds are wide and uninformative. While there is not a good bounding exercise for labor outcomes, the robustness of high school graduation to attrition concerns and the positive effect on college graduation in data that is not subject to differential attrition increases confidence in the positive labor market estimates. A more conservative interpretation is that the estimates capture the impact of the program on earnings and enrollment in Massachusetts among those who attended Massachusetts public high schools.

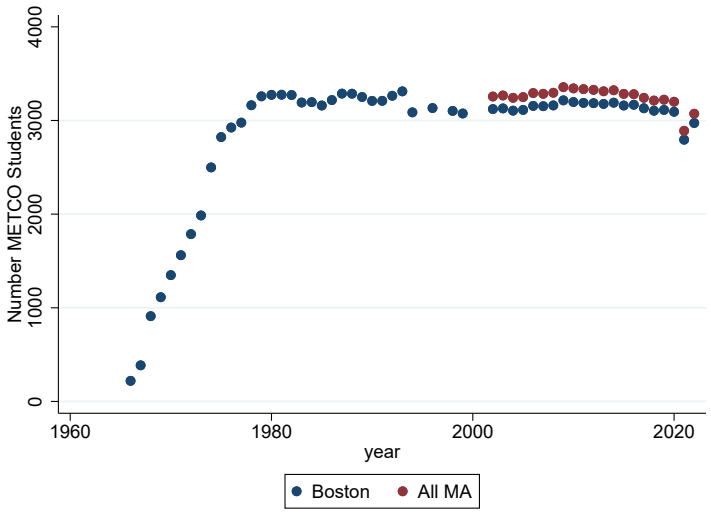
District heterogeneity

Appendix Figure 7 shows the individual district effects for SAT and AP testing. Nearly all school districts generate an increase in SAT exam taking, but there is heterogeneity in districts' effects on scores. Over half of the districts increase the likelihood that students score 1000 or higher on the SAT while other districts' effects are not statistically significantly different from zero at the 90 percent confidence level. Most districts have no significant effect on the likelihood that students score 1200 or higher on the SAT, but five increase high scores and one decreases the likelihood of high scores. Districts have differing impacts on AP exam taking and scores. While overall, METCO participation does not change AP outcomes, about half of the districts decrease the likelihood students take an AP exam (at 90 percent confidence level or higher) while five districts increase the likelihood students take an AP exam and the likelihood of passing an AP exam.

Most districts increase student aspirations to attend four-year colleges and the rest have no statistically significant impact (see Appendix Figure 6). Districts either have a significantly positive or a statistically insignificant effect for enrolling in a four-year competitive college and meeting the standardized testing high school graduation requirements. Most districts reduce the likelihood that students place in the top 10 percent of their graduating class and qualify for the Adams scholarship. The rest have no statistically significant impact on qualifying for the scholarship. On average, METCO doesn't increase the odds of attending one of the most competitive colleges (as classified by Barron's), but three districts increase the

likelihood. Overall, Appendix Figures 6 and 7 show that district-specific estimates generally similar to each other, although a small number of districts generate larger gains in SAT performance, AP outcomes, and enrollment at the most competitive colleges.

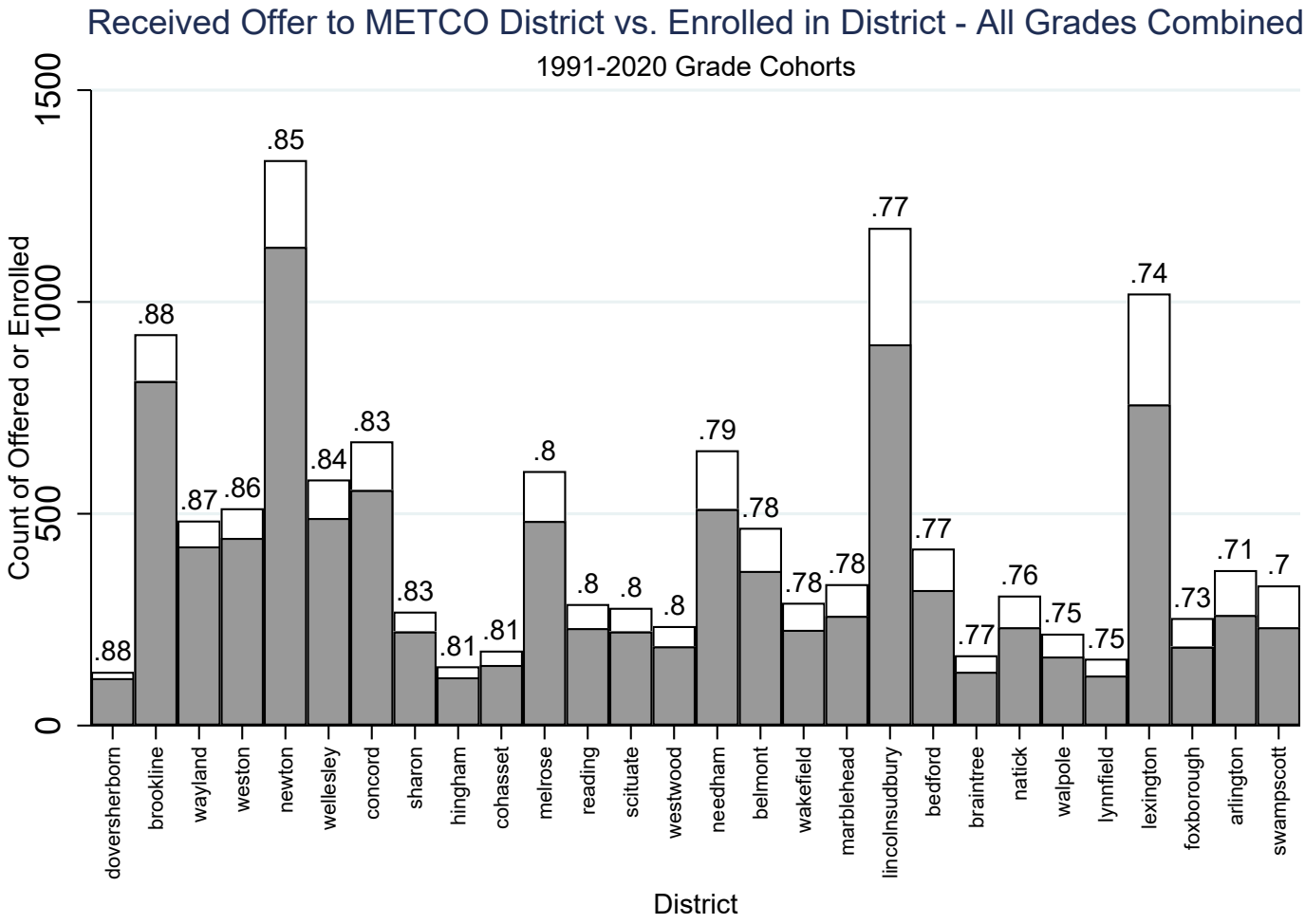
Appendix Figure 1: METCO Participation Over Time



Notes: This figure plots the total METCO participation since the program started in 1966. Pre-2001 data comes from the Northeastern University Archives METCO Collection and was only available for Boston, not for Springfield. Not all years were available in the archives. The 2001 - present data come from the Massachusetts Department of Elementary and Secondary Education. All MA includes the Boston and Springfield programs.

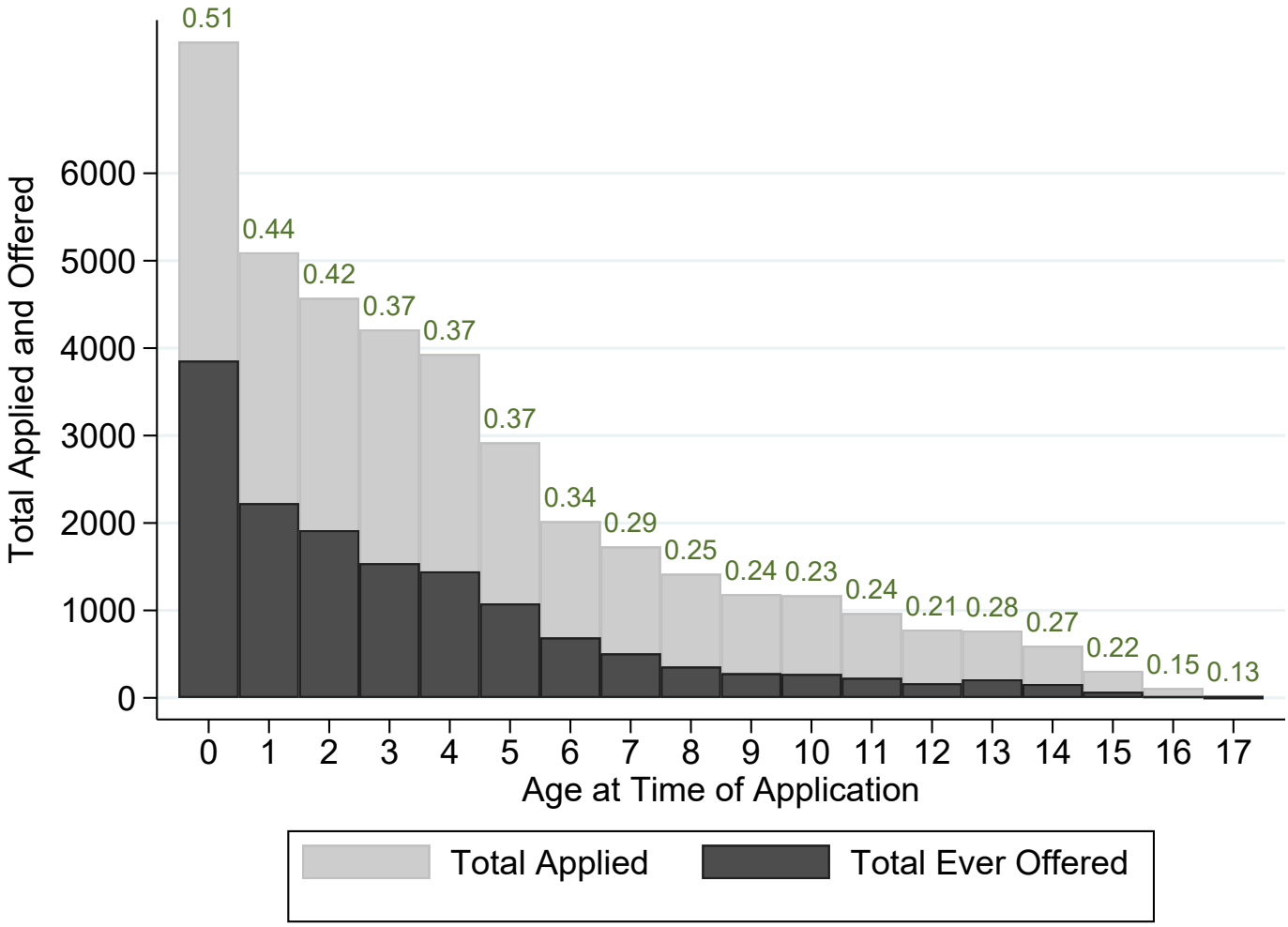
B Appendix Figures and Tables

Appendix Figure 2: District-Specific Offer and Participation Rates



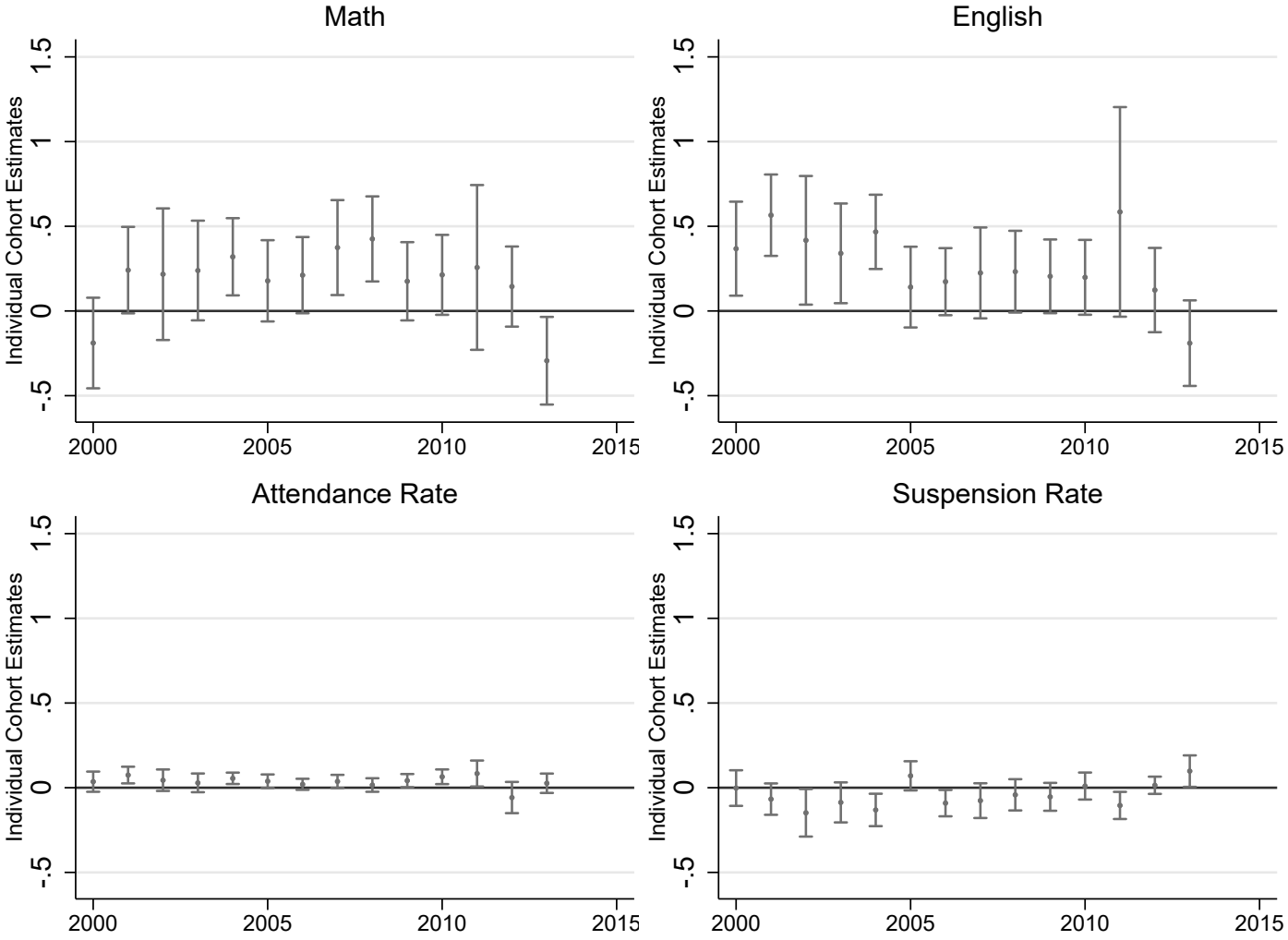
Notes: This figure plots the total METCO participation by suburban school district. The proportion that participate after receiving offers is shown in gray and the label above the bars. Data include those who start first grade in 1990 through 2019.

Appendix Figure 3: Offer Rates by Age of Application



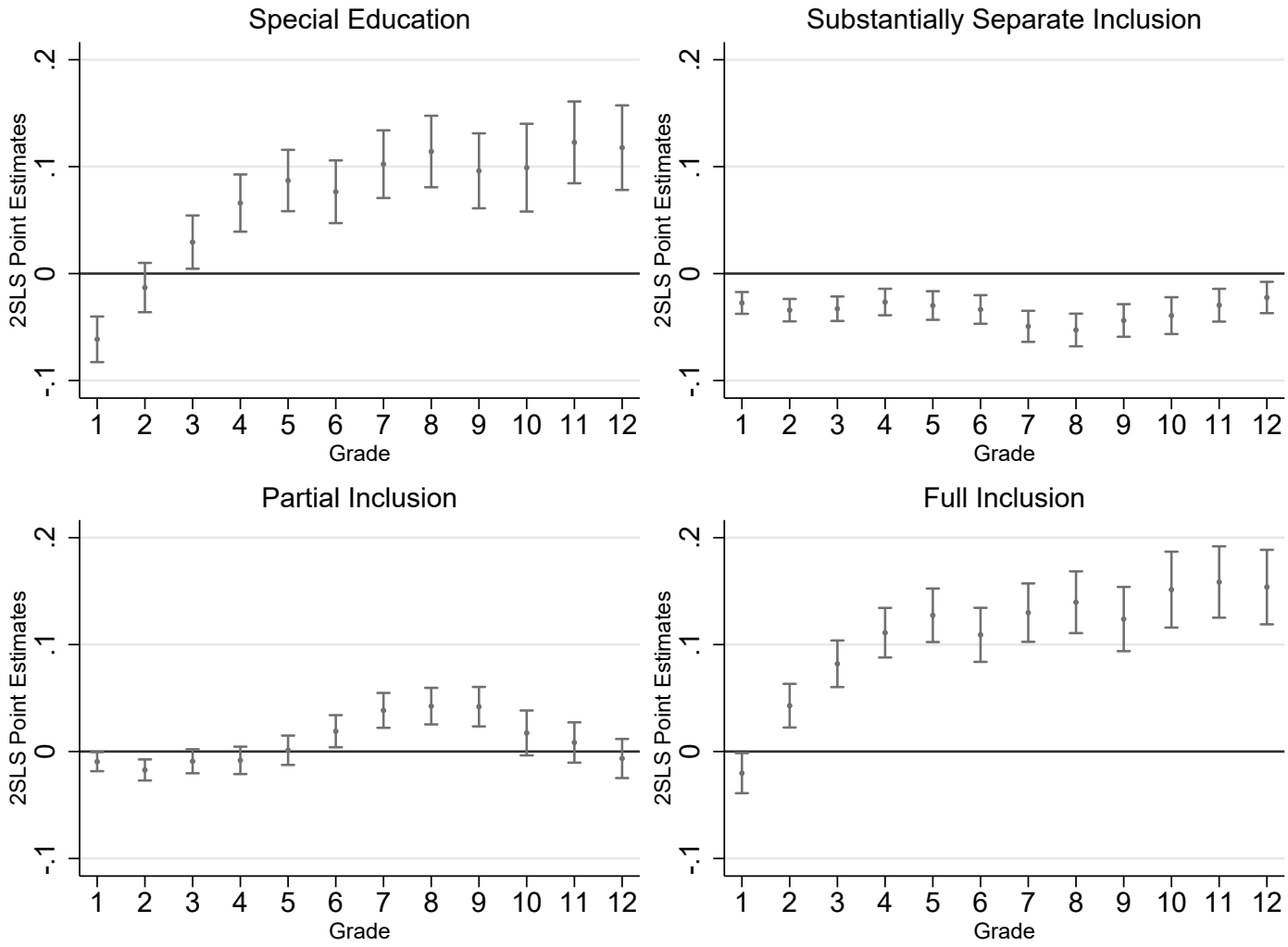
Notes: This figure plots the total METCO applications by children's ages in light gray. The number with offers by age is shown in dark gray and the proportion participating by age appears above the bar. Data include those who start first grade in 1990 through 2019.

Appendix Figure 4: 10th Grade Outcomes by Cohort



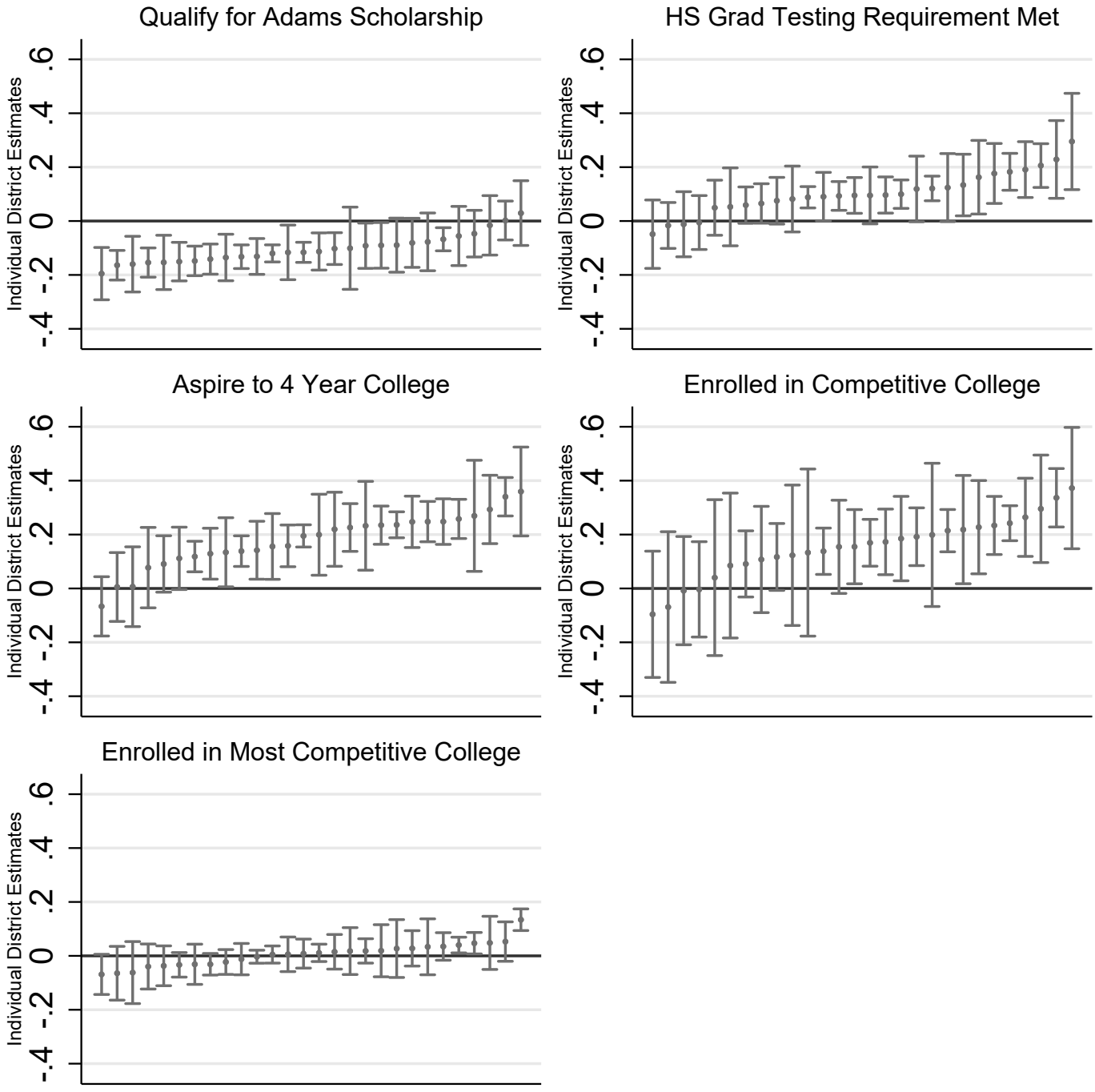
Notes: This figure plots the grade cohort-specific estimates for tenth grade outcomes.

Appendix Figure 5: 2SLS Effects of METCO on Special Education Status



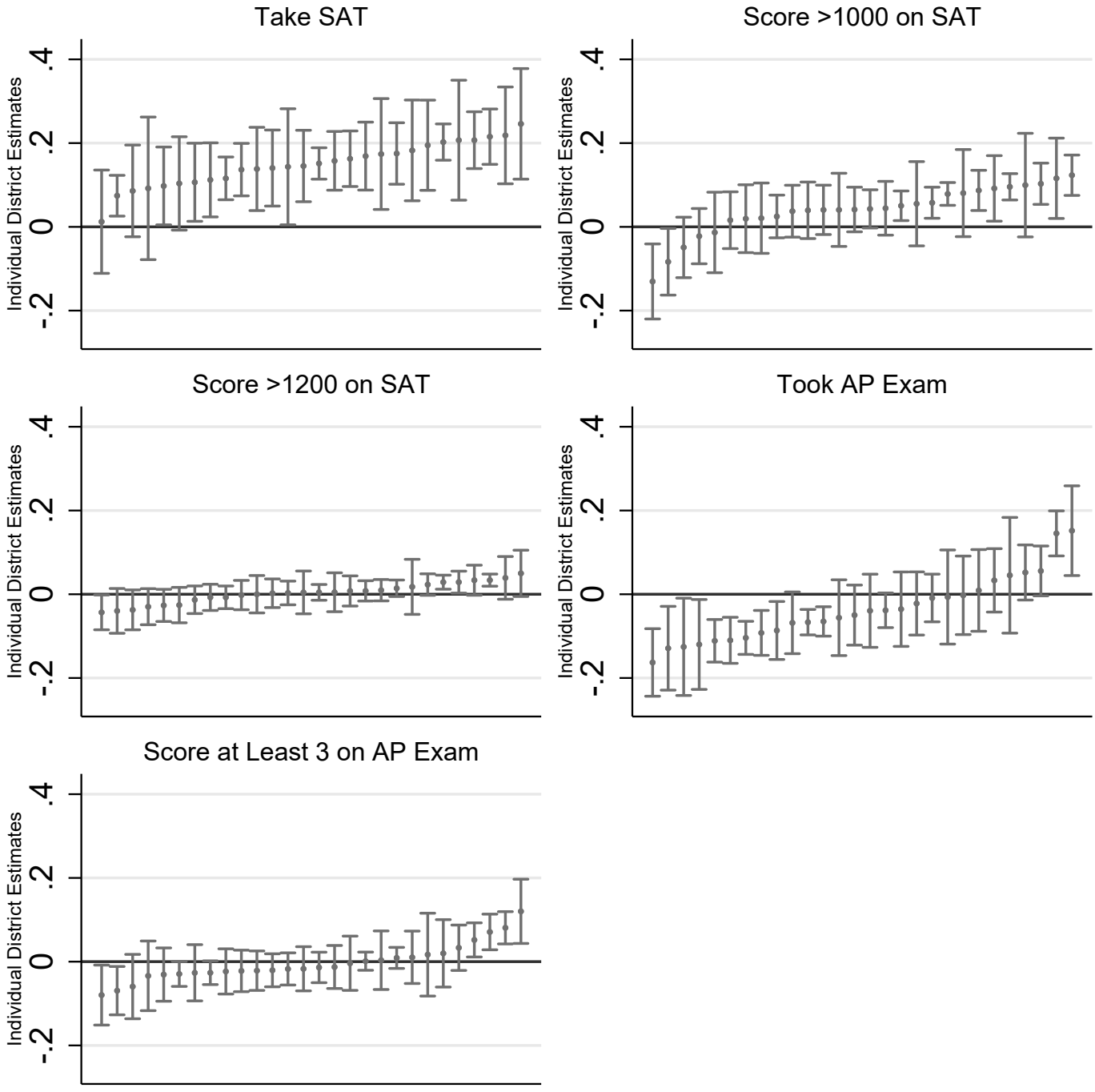
Notes: This figure shows the two-stage least squares estimates of the average impact of a year in METCO by each grade level on whether a student has any special education classification or a special education classification of a specific level of classroom inclusion. The endogenous variable is years in the METCO program by a given grade. The instrumental variables are a set of indicators that equal one of the student received an offer to enroll in each of the suburban districts by that grade. See Table 3 for the full list of control variables. Full inclusion means students spend less than 21 percent of their school day outside of a general education classroom. Partial inclusion means students spend between 21 and 60 percent of their time outside of a general education classroom. The substantially separate classroom designation means that students spend more than 60 percent of their time outside of a general education classroom.

Appendix Figure 6: Individual School District Estimates for College Preparation and Enrollment



Notes: This figure plots the estimates for individual suburban school districts, ordered from smallest to largest estimates. Figures show 90 percent confidence intervals. Each figure is estimated from a 2SLS model with multiple endogenous variables: indicators for whether the applicant ever attended each of the suburban districts. The instrumental variables are individual district METCO offers. The plotted estimates are the coefficients for each of the individual school districts. See Table 3 for the full set of controls. The sample includes students who were projected to graduate high school in 2003 and later.

Appendix Figure 7: Individual School District Estimates for SAT and AP Exams



Notes: This figure plots the estimates for individual suburban school districts, ordered from smallest to largest estimates. Figures show 90 percent confidence intervals. Each figure is estimated from a 2SLS model with multiple endogenous variables: indicators for whether the applicant ever attended each of the suburban districts. The instrumental variables are individual district METCO offers. The plotted estimates are the coefficients for each of the individual school districts. See Table 3 for the full set of controls. The sample includes students who were projected to graduate high school in 2003 and later.

Appendix Table 1: Match Rate of Application Data to Education Data and Birth Records

		Number of Applicants - Sample Restrictions			Education Data		Birth Records	
Outcome that defines the sample	1st grade cohorts in sample	All	Applied before grade 1	Without sibling preference & applied before grade 1	Match rate	Difference by offer status	Match rate	Difference by offer status
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
K-12	2003-2020	23,065	17,831	14,924	0.89	0.058***	0.77	0.030***
						(0.006)		(0.009)
High school	2003 - 2015	18,208	13,371	11,233	0.89	0.070***	0.76	0.034***
						(0.008)		(0.011)
College	1995 -2011	26,005	17,479	16,889	0.85	0.089***	0.72	0.060***
						(0.008)		(0.010)
Age 30 & college	1991 - 1999	13,530	8,639	8,182	0.76	0.012	0.64	0.001
						(0.028)		(0.036)
Age 30, college, & 10th grade	1993 - 1999	11,297	7,151	6,812	0.79	0.045	0.65	-0.010
						(0.034)		(0.042)
Age 35 & college	1991 - 1994	5,248	3,373	3,126	0.70	-0.031	0.59	-0.035
						(0.042)		(0.055)
All cohorts	1991 - 2020	41,377	29,688	27,369	0.85	0.061***	0.72	0.044***
						(0.006)		(0.008)

Notes: This table shows sample specifications and match rates across the analysis samples. Cohort group notes the outcomes that are available for those grade cohorts. First grade cohort year refers to the Spring of the academic year they entered first grade, so 2003 refers to the 2002-2003 school year. Columns 5 and 7 show the match rates of applicants who applied before grade 1 and did not have older siblings in METCO to the administrative K-12 education data and the Massachusetts birth records. Columns 6 and 8 show the regression estimates of whether the individual matched on whether they received an offer in first grade or earlier. Controls include race, gender, age at time of application (linear and squared), and indicators for which grade and year combinations students were in the applicant pool. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Appendix Table 2: Estimates Across Samples

Outcomes		Has grade 5 - 12 outcomes 2003-2015 (1)	College 1995 -2006 (2)	Age 30 with college outcomes 1991 - 1999 (3)	Age 30 with 10th grade & college outcomes 1993 - 1999 (4)	Age 35 with college outcomes 1991 - 1994 (5)
Grade 5 Math		0.121***	0.156***			
		(0.035)	(0.039)			
	N	8172	5396			
Grade 5 English		0.162***	0.217***			
		(0.036)	(0.040)			
	N	8176	5396			
Grade 8 Math		0.091**	0.103***	0.269***	0.269***	
		(0.035)	(0.039)	(0.032)	(0.032)	
	N	7176	5314	5605	5605	
Grade 8 English		0.180***	0.230***	0.174**	0.174**	
		(0.036)	(0.039)	(0.077)	(0.077)	
	N	7188	5330	1307	1307	
Grade 10 Math		0.132***	0.156***	0.301***	0.294***	0.330***
		(0.044)	(0.048)	(0.033)	(0.033)	(0.057)
	N	5486	4416	6784	6646	1818
Grade 10 English		0.211***	0.225***	0.406***	0.400***	0.484***
		(0.042)	(0.045)	(0.033)	(0.033)	(0.063)
	N	5521	4454	6839	6712	1815
Plan for 4-year college		0.163***	0.163***	0.221***	0.204***	0.267***
		(0.022)	(0.022)	(0.013)	(0.014)	(0.022)
	N	4717	4702	7045	6025	2531
4-year high school graduate		0.076***	0.076***	0.218***	0.220***	0.227***
		(0.016)	(0.016)	(0.011)	(0.012)	(0.018)
	N	5014	4998	8297	7101	3087
Enroll in 4-year College		0.211***	0.211***	0.227***	0.213***	0.283***
		(0.023)	(0.023)	(0.012)	(0.013)	(0.020)
	N	5741	5741	11050	9598	3948
Graduate from 4-year College		0.100***	0.100***	0.122***	0.112***	0.138***
		(0.024)	(0.024)	(0.010)	(0.011)	(0.017)
	N	2356	2356	11050	9598	3948
Earnings at age 25		7,716	7,716	7,661***	8,187***	6,567***
		(9913)	(9913)	(631)	(673)	(1094)
	N	1369	1369	10231	8880	3607
Earnings at age 30				12,071***	11,718***	11,640***
				(1015)	(1061)	(1830)
	N			10231	8880	3607

Notes: This table shows the regression results for a range of outcomes in the different analysis samples. See Table 3 for full sample specifications and controls. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Appendix Table 3: Robustness to Inclusion of Control Variables

		(1)	(2)	(3)	(4)	(5)	(6)
3rd Grade Math Score		0.103***	0.105***	0.122***	0.118***	0.117***	0.067*
		(0.026)	(0.026)	(0.035)	(0.035)	(0.038)	(0.037)
	N	14,345	14,345	9,009	9,008	7,501	7,501
	R-squared	0.058	0.058	0.063	0.066	0.063	0.116
3rd Grade English Score		0.186***	0.188***	0.196***	0.191***	0.177***	0.129***
		(0.024)	(0.025)	(0.033)	(0.033)	(0.036)	(0.035)
	N	15,410	15,410	9,557	9,556	7,927	7,927
	R-squared	0.071	0.072	0.068	0.072	0.070	0.117
10th Grade Math Score		0.169***	0.169***	0.134***	0.132***	0.152***	0.115**
		(0.031)	(0.031)	(0.044)	(0.044)	(0.047)	(0.046)
	N	9,545	9,545	5,487	5,486	4,512	4,512
	R-squared	0.092	0.094	0.104	0.112	0.113	0.161
10th Grade English Score		0.252***	0.257***	0.213***	0.211***	0.212***	0.174***
		(0.030)	(0.030)	(0.043)	(0.042)	(0.045)	(0.045)
	N	9,609	9,609	5,522	5,521	4,543	4,543
	R-squared	0.109	0.111	0.122	0.128	0.125	0.177
Dropout		-0.034***	-0.034***	-0.033***	-0.033***	-0.035***	-0.030***
		(0.005)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)
	N	9,078	9,078	5,109	5,108	4,210	4,210
	R-squared	0.015	0.016	0.020	0.021	0.021	0.039
Graduate high school in 4 years		0.161***	0.160***	0.139***	0.139***	0.138***	0.124***
		(0.010)	(0.010)	(0.013)	(0.013)	(0.014)	(0.014)
	N	9,078	9,078	5,109	5,108	4,210	4,210
	R-squared	0.080	0.081	0.083	0.085	0.088	0.119
Meets standardized testing high school graduation requirement		0.086***	0.085***	0.059***	0.060***	0.065***	0.053***
		(0.013)	(0.013)	(0.017)	(0.017)	(0.019)	(0.019)
	N	7,609	7,609	4,247	4,246	3,492	3,492
	R-squared	0.046	0.047	0.047	0.053	0.048	0.072
Take SAT		0.177***	0.176***	0.175***	0.175***	0.177***	0.167***
		(0.012)	(0.012)	(0.016)	(0.016)	(0.018)	(0.018)
	N	11,062	11,062	6,265	6,264	5,052	5,052
	R-squared	0.110	0.110	0.112	0.115	0.118	0.133
SAT 1000 or higher		0.077***	0.078***	0.088***	0.088***	0.093***	0.082***
		(0.009)	(0.010)	(0.013)	(0.013)	(0.015)	(0.015)
	N	11,062	11,062	6,265	6,264	5,052	5,052
	R-squared	0.087	0.089	0.087	0.094	0.097	0.125
Aspire to 4-year college		0.180***	0.180***	0.167***	0.167***	0.163***	0.148***
		(0.013)	(0.013)	(0.018)	(0.018)	(0.019)	(0.019)
	N	8,343	8,343	4,705	4,704	3,879	3,879
	R-squared	0.085	0.086	0.084	0.089	0.091	0.122
Enroll in 4-year college		0.208***	0.215***	0.221***	0.221***	0.196***	0.176***
		(0.009)	(0.009)	(0.012)	(0.012)	(0.013)	(0.013)
	N	19,818	19,818	12,085	12,083	8,805	8,805
	R-squared	0.068	0.069	0.070	0.074	0.080	0.130
Graduate 4-year college within 6 years		0.130***	0.135***	0.130***	0.130***	0.121***	0.108***
		(0.008)	(0.008)	(0.010)	(0.010)	(0.012)	(0.012)
	N	19,818	19,818	12,085	12,083	8,805	8,805
	R-squared	0.070	0.071	0.067	0.072	0.076	0.117
Income at age 25		5,895***	7,328***	7,612***	7,708***	8,134***	8,914***
		(1090)	(699)	(1324)	(1330)	(1037)	(1746)
	N	3,487	3,487	2,174	2,174	1,448	1,448
	R-squared	0.105	0.107	0.120	0.121	0.129	0.132
Income at age 30		10,811***	12,920***	14,273***	14,091***	15,520***	16,775***
		(1835)	(1176)	(2296)	(2304)	(1837)	(3090)
	N	3,487	3,487	2,174	2,174	1,448	1,448
	R-squared	0.041	0.044	0.055	0.058	0.063	0.066
Controls							
Excludes those with enrolled siblings		X	X	X	X	X	X
Fixed effects for the years and grades in the applicant pool		X	X	X	X	X	X
Race & gender		X	X	X	X	X	X
Immigrant, English learner, disability that may affect bus need		X	X	X	X	X	X
Age at application			X	X	X	X	X
Applied before grade 1				X	X	X	X
Neighborhood at application time					X	X	X
Matched to birth records						X	X
Vital statistics controls							X

Notes: This table shows that the 2SLS estimates of the impact of participating in METCO on outcomes are robust to the controls variables

Appendix Table 4: 2SLS Effects of METCO with Years in METCO as Endogenous Variable

	Non-METCO 3rd Grade Mean	Grade-level 3	4	5	6	7	8	9	10	11	12
Effect of any offer on years in METCO											
Years in METCO		2.028***	2.596***	3.115***	3.611***	4.132***	4.685***	5.077***	4.960***	6.477***	7.199***
		(0.017)	(0.022)	(0.028)	(0.033)	(0.039)	(0.046)	(0.055)	(0.070)	(0.077)	(0.088)
Two-Stage Least Squares Results: Average Impact of a Year in METCO											
Math	-0.403	0.038***	0.035***	0.027***	0.010*	0.011**	0.013***		0.014***		
	(1.059)	(0.011)	(0.008)	(0.007)	(0.006)	(0.005)	(0.004)		(0.004)		
N	7146	9001	8831	8168	8494	7854	7172		5482		
F-Stat		501	503	463	475	439	410		195		
P-Value		0.000	0.000	0.000	0.000	0.000	0.000		0.000		
English	-0.390	0.060***	0.050***	0.034***	0.025***	0.022***	0.023***		0.021***		
	(1.055)	(0.011)	(0.008)	(0.007)	(0.006)	(0.005)	(0.004)		(0.004)		
N	7612	9549	8826	8172	8511	7870	7184		5517		
F-Stat		544	498	460	474	438	409		194		
P-Value		0.000	0.000	0.000	0.000	0.000	0.000		0.000		
Attendance rate	0.907	0.008***	0.007***	0.005***	0.005***	0.003***	0.003***	0.006***	0.005***	0.004***	0.004***
	(0.176)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
N	8868	11013	10373	9751	9603	8998	8228	7426	6470	5486	4913
F-Stat		597	554	519	509	472	436	374	219	320	299
P-Value		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suspended	0.050	-0.009***	-0.012***	-0.013***	-0.007***	-0.005***	-0.004***	-0.005***	-0.002	-0.001	-0.001
	(0.217)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
N	8868	11013	10373	9751	9603	8998	8228	7426	6470	5486	4913
F-Stat		597	554	519	509	472	436	374	219	320	299
P-Value		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: The first row shows the effect of getting an offer to any METCO district by a given grade-level on years in the METCO program to show the average years of treatment for each grade level. The other rows report the 2SLS estimates of the average effect of one year in the METCO program on test score and behavioral outcomes. The endogenous variable is years enrolled in the METCO program by that specific grade. All 2SLS models use individual school district METCO offers as instrumental variables and control for race, gender, age at time of application (linear and squared), neighborhood indicators at the time of application, indicators for which grade and year combinations students were in the applicant pool, whether students ever had an English Learner status, immigrant status, and whether the student had a special education classification that may require specialized bussing by first grade. The sample includes those who applied before the first grade and excludes those with sibling preference. Standard deviations are in parentheses in the first column and standard errors are in parentheses in other columns. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Appendix Table 5: Balance on Predicted College Outcomes

		Not Offered Mean of Real Outcome	Correlation of Predicted Outcome and Real Outcome	Difference Between Offered and Non-offered	Effect Size	Difference/Effect Size
		(1)	(2)	(3)	(4)	(5)
Enroll in 4-year College		0.544	0.093***	0.011***	0.223***	5%
			(0.006)	(0.004)	(0.011)	
	N	6,607	3,183	10,839	12,900	
Graduate 4-Year College		0.294	0.086***	0.009**	0.112***	8%
			(0.006)	(0.003)	(0.011)	
	N	6,607	2,261	10,839	10,392	

Notes: This table displays the difference between the predicted college enrollment and graduation for those with and without offers. The prediction is calibrated in the sample that did not enroll in METCO using the full set of baseline characteristics (see Table 2). The sample includes applicants who entered first grade in 1995 through 2006 for college graduation and 1995 through 2010 for college enrollment. Column 4 shows the 2SLS estimates of the impact of METCO enrollment on college outcomes. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Appendix Table 6: Oster Specification

	R-Squared			Intent to Treat Estimates		Alternative δ	
	Uncontrolled	Controlled	δ $\max R^2 = 1.3 * R\text{^}2$	Simple Estimate	Adjusted Estimate	δ $\max R^2 = 2 * R\text{^}2$	δ $\max R^2 = 3 * R\text{^}2$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
5th Grade Math Score	0.002	0.147	23.0	0.097	0.095	7.1	1.7
5th Grade English Score	0.005	0.149	7.2	0.103	0.090	2.2	0.8
5th Grade Attendance Rate	0.002	0.026	8.7	0.008	0.007	2.9	1.1
5th Grade Suspension Rate	0.004	0.046	12.4	-0.034	-0.032	4.3	1.6
10th Grade Math Score	0.000	0.163	18.6	0.055	0.053	5.7	0.9
10th Grade English Score	0.003	0.178	12.4	0.089	0.083	3.8	0.9
10th Grade Attendance Rate	0.007	0.442	5.5	0.028	0.023	1.7	1.8
10th Grade Suspension Rate	0.000	0.046	79.4	-0.007	-0.007	24.0	2.6
Graduate high school in 4 years	0.024	0.110	8.7	0.116	0.109	3.4	1.2
Graduate in 5 years	0.020	0.094	9.4	0.105	0.099	3.8	1.3
Meets graduation requirement	0.002	0.072	34.9	0.046	0.045	11.3	2.0
Qualify for Adams scholarship	0.013	0.120	12.8	-0.074	-0.071	4.5	3.5
Take SAT	0.016	0.191	9.5	0.109	0.101	3.2	1.2
SAT 800 or higher	0.014	0.160	8.8	0.103	0.094	3.0	1.1
SAT 1000 or higher	0.004	0.151	9.3	0.049	0.045	2.9	0.9
Took AP	0.002	0.136	-240.1	-0.044	-0.045	-74.7	-8.4
Apire to college	0.008	0.084	12.1	0.066	0.062	4.2	1.5
Aspire to 4-year college	0.014	0.116	11.4	0.099	0.093	4.0	1.5
Enroll in any college	0.030	0.133	10.1	0.109	0.102	3.7	1.3
Enroll in 4-year college	0.030	0.156	10.5	0.132	0.124	3.8	1.3
Enroll in highly competitive college	0.001	0.100	-25.0	0.018	0.019	-7.7	1.6
Enroll in very competitive	0.001	0.082	86.2	0.031	0.031	27.1	1.6
Enroll in competitive college	0.021	0.140	13.2	0.112	0.107	4.7	1.3
Complete one academic semester	0.007	0.106	39.1	0.055	0.055	12.5	2.4
Complete three academic semesters	0.008	0.118	25.2	0.072	0.071	8.3	1.8
Complete five academic semesters	0.006	0.119	14.2	0.049	0.047	4.5	1.4
Complete seven academic semesters	0.006	0.116	18.3	0.051	0.049	5.8	1.4
Graduate from college within 6 years	0.009	0.160	31.9	0.075	0.074	10.4	1.9
Graduate 4-year college within 6 years	0.009	0.157	29.6	0.075	0.074	9.8	1.9
Income at age 25	0.004	0.031	21.4	5367	5295	7.3	3.8
Income at age 30	0.020	0.031	8.6	8442	8720	4.6	2.2
Income at age 35	0.019	0.065	22.6	4198	4273	8.2	-3.2

Notes: This table displays selection on observables estimates as suggested by Altonji, Elder, and Taber (2005) and Oster (2019). Column 1 shows the R-squared of the regression of the outcome on ever participating in METCO. Column 2 shows the R-squared from the same regression with the full set of baseline demographic controls including race, ethnicity, gender, English learner status, immigrant status, disability status, age at time of application, neighborhood traits, grade cohort, and vital statistics traits. The estimates of the minimum ratio of selection on unobservables to selection on observables needed to make the estimated coefficients zero appear in Column 3. These estimates assume the R-squared of a model with unobserved and observed controls is 1.3 times the size of the R-squared in the controlled model. Column 6 shows an R-squared multiplier of two. The simple intent to treat estimates with all observable controls appear in Column 4. Column 5 shows the estimates adjusted for unobservable controls with an R-squared ratio of 1.3 and assumes that bias from unobservables is equal to the bias from observables.

Appendix Table 7: Family Fixed Effects Sample Descriptives

					Within Family:				
	Sibling Sample Mean	Sibling - Analysis Sample	SE	N	METCO Sibling - No Offer	SE	METCO Offer - No Offer	SE	N
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Applicant Characteristics									
Age applied	2.196	-0.010	(0.033)	14396	0.066	(0.075)	0.056	(0.093)	2874
Year entered 1st grade	2005	4.3***	(0.103)	14396	-1.3***	(0.182)	-1.6***	(0.224)	2874
Birthweight	3217	-35.6***	(12.301)	10392	13.1	(25.644)	-5.0	(31.017)	2052
Apgar 5	8.841	-0.033**	(0.013)	10381	-0.015	(0.031)	-0.018	(0.038)	2051
Parents married at birth	0.380	-0.028***	(0.009)	10762	0.011	(0.017)	0.007	(0.021)	2139
No father on birth certificate	0.299	-0.092***	(0.009)	10420	-0.017	(0.020)	-0.006	(0.024)	2057
Has older sibling	0.629	-0.078***	(0.009)	10762	-0.119***	(0.027)	-0.135***	(0.033)	2139
Medicaid at birth	0.475	0.082***	(0.010)	10420	-0.043**	(0.021)	-0.056**	(0.025)	2057
Female	0.498	0.005	(0.008)	14388	0.116***	(0.019)	0.104***	(0.024)	2872
Disability bus need	0.009	0.012***	(0.002)	14396	-0.006*	(0.004)	-0.007	(0.005)	2874
Immigrant	0.010	0.008***	(0.002)	13546	-0.006	(0.004)	-0.006	(0.005)	2782
Enrolled in pre-K	0.171	0.157***	(0.007)	13546	-0.031**	(0.013)	-0.040**	(0.016)	2782
Ever English Learner	0.096	0.096***	(0.006)	12673	-0.018*	(0.010)	-0.011	(0.013)	2593
Mother's Highest Education									
High school	0.348	0.011	(0.009)	10762	-0.026	(0.021)	-0.030	(0.025)	2139
Some college	0.263	-0.042***	(0.009)	10762	0.019	(0.020)	0.002	(0.024)	2139
2-year college	0.088	0.046***	(0.006)	10762	0.005	(0.013)	0.004	(0.016)	2139
College or more	0.174	0.015**	(0.007)	10762	-0.011	(0.013)	0.003	(0.016)	2139
Father's Highest Education									
High school	0.303	0.044***	(0.009)	10762	-0.013	(0.021)	-0.013	(0.025)	2139
Some college	0.159	-0.011	(0.007)	10762	0.027*	(0.016)	0.017	(0.019)	2139
2-year college	0.052	0.044***	(0.005)	10762	-0.001	(0.011)	0.008	(0.013)	2139
College or more	0.144	0.028***	(0.007)	10762	0.010	(0.013)	0.007	(0.016)	2139
Neighborhood									
Dorchester	0.457	-0.002	(0.002)	14395	0.002	(0.004)	0.003	(0.004)	2874
Roxbury	0.177	-0.001	(0.002)	14395	0.004	(0.003)	0.000	(0.004)	2874
Mattapan or Roslindale	0.146	-0.001	(0.001)	14395	-0.002	(0.002)	-0.004	(0.003)	2874
Neighborhood traits									
% high school grad	0.280	-0.002	(0.001)	14220	-0.002	(0.002)	0.000	(0.003)	2835
% college grad	0.171	0.000	(0.001)	14220	0.000	(0.002)	-0.002	(0.003)	2835
% homeowner	0.377	0.005*	(0.003)	14212	-0.004	(0.005)	-0.009	(0.006)	2833
% single parent	0.556	-0.007**	(0.004)	13995	-0.004	(0.006)	0.003	(0.008)	2799
Median gross rent	1417.641	7.569	(6.306)	12533	7.048	(10.935)	3.925	(13.343)	2468
% public assistance	0.292	-0.002	(0.002)	14212	0.001	(0.004)	0.006	(0.004)	2833
Demographics									
Asian	0.034	0.003	(0.002)	14396	0.012***	(0.004)	0.011**	(0.005)	2874
Black	0.849	-0.020***	(0.005)	14396	0.041***	(0.007)	0.051***	(0.009)	2874
Hispanic	0.274	0.044***	(0.007)	14396	0.017	(0.011)	0.032**	(0.014)	2874

Notes: This table shows traits of the family fixed effects sample from the time of application and birth records. Column 2 shows the difference between the family fixed effects sample and the main analysis sample. Columns 5 through 9 show the differences within families from a regression of the trait on whether the sibling participated (Column 5) or got an offer (Column 7). *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Appendix Table 8: Attrition

	Excludes Students That Never Match to Public School Data			All Applicants (including always out of state or in private school)		
Outcome variable	Non-treated Mean (1)	Intent to Treat (2)	2SLS (3)	Non-treated Mean (4)	Intent to Treat (5)	2SLS (6)
Matched to education data	1.000	-	-	0.858	0.058***	0.095***
					(0.006)	(0.010)
N					14910	
Has any outcomes for:						
Elementary School	0.955	0.024***	0.038***	0.820	0.079***	0.128***
		(0.004)	(0.007)		(0.007)	(0.012)
N		12116			13614	
Middle School	0.875	0.028***	0.046***	0.748	0.087***	0.139***
		(0.008)	(0.013)		(0.010)	(0.016)
N		9955			11220	
High School	0.836	0.032***	0.051***	0.696	0.102***	0.149***
		(0.011)	(0.016)		(0.013)	(0.019)
N		6591			7558	
Has any test scores for:						
Elementary School	0.807	0.050***	0.083***	0.693	0.097***	0.160***
		(0.007)	(0.011)		(0.009)	(0.014)
N		12116			13614	
Middle School	0.844	0.035***	0.059***	0.721	0.095***	0.153***
		(0.009)	(0.014)		(0.010)	(0.016)
N		9955			11220	
High School	0.641	0.077***	0.116***	0.533	0.136***	0.201***
		(0.013)	(0.019)		(0.014)	(0.020)
N		6591			7558	
Has non-missing value for						
Plan for college	0.668	0.093***	0.138***	0.556	0.152***	0.223***
		(0.014)	(0.020)		(0.015)	(0.021)
N		6591			7558	
4-year high school graduate	0.724	0.080***	0.120***	0.603	0.140***	0.206***
		(0.014)	(0.019)		(0.014)	(0.021)
N		6591			7558	
5-year high school graduate	0.665	0.094***	0.136***	0.549	0.158***	0.223***
		(0.015)	(0.021)		(0.016)	(0.022)
N		5812			6693	

Notes: This table shows the rates of applicants that have non-missing outcomes data. Columns 1 through 3 exclude students that never appear in the administrative K-12 education data. These include students that enroll in private school or an out of state school for their whole K-12 education and students who we were unable to match. Columns 4 through 6 include these unmatched students, who by definition will not have any K-12 education outcomes data. The sample includes those who applied to METCO by grade 1 and enrolled in first grade after 2002. Applicants with sibling preference are excluded from the sample. The endogenous variable for the Intent to Treat models is an indicator for whether applicants received offers on or before grade 1. The endogenous variable for the 2SLS models is whether the student ever participated in METCO and individual district offers are the instruments. See Table 3 for the full list of control variables. Columns 5 and 6 do not control for English Learner, immigrant, or disability status because that information is not available for those who do not match to the administrative education data. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; *

Appendix Table 9: Lee Bounds Specification

	Full sample				Parents did not graduate college			
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
5th Grade Math Score	-0.160	0.465	-0.025	0.334	-0.092	0.298	-0.041	0.250
5th Grade English Score	-0.069	0.533	0.051	0.391	0.031	0.405	0.076	0.350
5th Grade Attendance Rate	-0.002	0.029	0.004	0.023	0.000	0.022	0.002	0.020
5th Grade Suspension Rate	-0.097	-0.045	-0.089	-0.050	-0.097	-0.057	-0.094	-0.059
10th Grade Math Score	-0.196	0.421	-0.085	0.290	-0.154	0.249	-0.108	0.200
10th Grade English Score	-0.104	0.433	-0.005	0.328	-0.026	0.335	0.012	0.289
10th Grade Attendance Rate	0.004	0.087	0.018	0.060	0.019	0.062	0.023	0.052
10th Grade Suspension Rate	-0.111	0.009	-0.078	-0.005	-0.093	0.005	-0.073	-0.001
10th Grade Math Meets Proficiency	-0.044	0.212	-0.001	0.138	-0.038	0.123	-0.023	0.091
10th Grade English Meets Proficiency	-0.003	0.132	0.019	0.111	0.012	0.108	0.020	0.105
Graduate high school in 4 years	0.100	0.235	0.119	0.167	0.103	0.194	0.110	0.157
Graduate in 5 years	0.089	0.209	0.105	0.154	0.089	0.175	0.095	0.141
Meets graduation requirement	-0.041	0.238	-0.003	0.163	-0.038	0.147	-0.023	0.109
Qualify for Adams scholarship	-0.170	-0.029	-0.142	-0.051	-0.172	-0.096	-0.172	-0.099
Take SAT	0.077	0.254	0.120	0.169	0.074	0.167	0.089	0.136
SAT 800 or higher	0.053	0.237	0.111	0.160	0.059	0.155	0.081	0.128
SAT 1000 or higher	-0.037	0.139	0.051	0.093	-0.013	0.070	0.018	0.057
Took AP	-0.169	0.016	-0.076	-0.026	-0.156	-0.066	-0.121	-0.074
Apire to college	0.019	0.222	0.044	0.185	0.046	0.214	0.056	0.192
Aspire to 4-year college	0.034	0.319	0.079	0.234	0.068	0.259	0.085	0.221
Enroll in any college	0.139	0.150	0.072	0.095	0.093	0.121	0.090	0.121
Enroll in 4-year college	0.164	0.176	0.117	0.140	0.120	0.153	0.121	0.159
Enroll in highly competitive college	0.015	0.022	0.002	0.019	0.005	0.031	0.002	0.032
Enroll in very competitive	0.014	0.026	-0.003	0.020	0.019	0.050	0.018	0.054
Enroll in competitive college	0.129	0.140	0.084	0.107	0.089	0.123	0.088	0.126
Complete one academic semester	0.084	0.095	0.040	0.063	0.053	0.082	0.057	0.089
Complete three academic semesters	0.093	0.105	0.058	0.081	0.065	0.095	0.069	0.103
Complete five academic semesters	0.086	0.097	0.056	0.079	0.056	0.090	0.060	0.098
Complete seven academic semesters	0.082	0.093	0.055	0.078	0.043	0.077	0.047	0.085
Graduate from college within 6 years	0.087	0.097	0.063	0.083	0.049	0.081	0.052	0.089
Graduate 4-year college within 6 years	0.096	0.106	0.074	0.095	0.048	0.081	0.053	0.089
Income at age 25	-3211	3791	-1672	2890				
Tightend bounds on age app	X		X		X		X	
Tightened bounds on grade cohort	X		X		X		X	
Tightened bounds on Black (for K-12 outcomes)	X		X					
Restrict to ever in public school data			X				X	
Restrict to parents did not graduate college					X		X	

Notes: This table shows the Lee bounds intent to treat estimates for the effect of METCO offers by the first grade on outcomes. The first two columns use the whole applicant pool for years and tightens on age at the time of application and four-year bins of grade cohorts. The next two columns restrict to those who appear at least once in the public K-12 data and uses the same covariates. The remaining columns carry out the same analyses, but restrict to applicants whose parents did not graduate college. The grade 3 through 10 outcomes include applicants who entered first grade in 2002-03 through 2012-13. The late high school and high school graduation outcomes include applicants who entered first grade in 2002-03 through 2010-11. The college outcomes include those who entered first grade in 2000-01 through 2004-05.

Appendix Table 10: Subgroup Effects by Predicted Attrition Likelihood

		Predict Attrit>p75		Predict Attrit<=p25		Predict Attrit>p90		Predict Attrit<p10	
		Non-METCO Mean	2SLS	Non-METCO Mean	2SLS	Non-METCO Mean	2SLS	Non-METCO Mean	2SLS
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
3rd Grade Math		-0.300	0.098	-0.490	0.398***	-0.370	0.132	-0.665	0.290
			(0.068)		(0.116)		(0.089)		(0.193)
	N	2609	3633	1360	1839	1946	2620	563	750
3rd Grade English		-0.284	0.207***	-0.488	0.269**	-0.355	0.205**	-0.623	0.075
			(0.064)		(0.111)		(0.082)		(0.188)
	N	2778	3880	1434	1930	2087	2816	594	792
4th Grade Math		-0.315	0.191***	-0.525	0.174	-0.368	0.200**	-0.682	-0.020
			(0.066)		(0.112)		(0.086)		(0.188)
	N	2554	3569	1342	1810	1934	2596	570	758
4th Grade English		-0.280	0.215***	-0.513	0.160	-0.350	0.292***	-0.656	0.056
			(0.066)		(0.112)		(0.086)		(0.193)
	N	2554	3567	1344	1811	1934	2593	572	758
5th Grade Math		-0.213	0.167**	-0.449	0.286***	-0.274	0.179**	-0.611	0.213
			(0.068)		(0.110)		(0.088)		(0.184)
	N	2364	3323	1272	1707	1798	2426	548	722
5th Grade English		-0.218	0.133*	-0.443	0.201*	-0.294	0.150*	-0.602	0.033
			(0.069)		(0.114)		(0.090)		(0.196)
	N	2366	3326	1272	1709	1799	2428	548	722
6th Grade Math		-0.184	0.013	-0.412	0.305***	-0.248	0.000	-0.533	-0.014
			(0.061)		(0.107)		(0.077)		(0.180)
	N	2429	3436	1291	1728	1833	2498	536	708
6th Grade English		-0.187	0.085	-0.409	0.265**	-0.252	0.097	-0.546	0.170
			(0.062)		(0.110)		(0.079)		(0.184)
	N	2437	3448	1294	1728	1836	2503	539	710
7th Grade Math		-0.182	0.054	-0.412	0.232**	-0.235	0.066	-0.551	0.173
			(0.064)		(0.112)		(0.080)		(0.172)
	N	2328	3249	1165	1577	1745	2348	489	653
7th Grade English		-0.141	0.095	-0.396	0.296**	-0.203	0.119	-0.544	0.334*
			(0.065)		(0.116)		(0.082)		(0.192)
	N	2334	3257	1172	1583	1753	2358	493	655
8th Grade Math		-0.178	0.070	-0.422	0.371***	-0.238	0.117	-0.565	0.468**
			(0.066)		(0.124)		(0.084)		(0.203)
	N	2098	2954	1085	1459	1594	2146	465	614
8th Grade English		-0.177	0.151**	-0.388	0.386***	-0.253	0.198**	-0.551	0.664***
			(0.067)		(0.125)		(0.087)		(0.213)
	N	2099	2955	1083	1461	1597	2150	463	613
10th Grade Math		-0.165	0.093	-0.362	0.173	-0.221	0.130	-0.500	0.360
			(0.082)		(0.144)		(0.107)		(0.244)
	N	1623	2343	753	1055	1217	1689	336	448
10th Grade English		-0.122	0.211***	-0.337	0.202	-0.188	0.224**	-0.446	0.083
			(0.077)		(0.140)		(0.101)		(0.248)
	N	1633	2359	755	1058	1226	1702	337	451
Graduate HS in 4 Years		0.741	0.113***	0.671	0.195***	0.715	0.125***	0.613	0.179**
			(0.026)		(0.044)		(0.034)		(0.070)
	N	2298	3193	1193	1586	1766	2350	517	674
Aspire to 4 Year College		0.638	0.155***	0.508	0.175***	0.612	0.173***	0.494	0.071
			(0.031)		(0.055)		(0.039)		(0.083)
	N	1750	2538	838	1158	1313	1830	348	466
Enroll in 4 Year College within 2 Years		0.439	0.174***	0.440	0.181***	0.398	0.187***	0.406	0.251***
			(0.027)		(0.044)		(0.033)		(0.073)
Graduate College within 6 Years		0.222	0.068***	0.181	0.113***	0.206	0.036	0.144	0.185***
			(0.025)		(0.035)		(0.029)		(0.055)
	N	2779	2232	835	890	2308	1680	340	358
Income 25		7587	5,198*	15545	9,339**	6894	6,552*	14587	7,269
			(2908)		(3712)		(3369)		(4805)
	N	6491	5674	1155	1493	5773	4779	428	598
Income 30		10230	15,097**	18715	1,328	9790	13,658**	18477	18,818
			(6036)		(21779)		(6396)		(29622)
	N	4622	3880	536	673	4213	3406	194	279

Notes: This table shows the 2SLS estimates of the effect of METCO participation on a range out outcomes separately by predicted attrition likelihood. The predicted attrition likelihood measure is estimated on applicants that applied before first grade, entered first

Appendix Table 11: Selection into METCO Application

	OLS Boston Students (BPS, Charter, METCO)		OLS METCO Applicants			2SLS METCO Applicants						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Math	0.063***	0.196***	0.054***	0.058***	0.044**	0.096***	0.115***	0.121***	0.121***	0.122***	0.054*	0.109***
	(0.016)	(0.016)	(0.020)	(0.021)	(0.021)	(0.027)	(0.043)	(0.035)	(0.035)	(0.037)	(0.031)	(0.040)
N	62,943	62,943	9,724	9,724	9,723	9,723	7,388	8,172	8,172	6,772	6,482	5,271
English	0.274***	0.357***	0.155***	0.155***	0.136***	0.160***	0.161***	0.162***	0.162***	0.150***	0.095***	0.119***
	(0.015)	(0.016)	(0.021)	(0.021)	(0.021)	(0.028)	(0.044)	(0.036)	(0.036)	(0.038)	(0.031)	(0.040)
N	62,186	62,186	9,734	9,734	9,733	9,733	7,391	8,176	8,176	6,778	6,494	5,279
Attendance Rate	0.030***	0.029***	0.025***	0.025***	0.025***	0.026***	0.024***	0.023***	0.023***	0.023***	0.024***	0.021***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
N	66,493	66,493	10,775	10,775	10,774	10,774	8,214	9,067	9,067	7,532	7,195	5,863
Suspended	-0.045***	-0.064***	-0.073***	-0.073***	-0.074***	-0.072***	-0.069***	-0.070***	-0.070***	-0.076***	-0.062***	-0.063***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.007)	(0.012)	(0.010)	(0.010)	(0.010)	(0.008)	(0.011)
N	66,490	66,490	10,775	10,775	10,774	10,774	8,214	9,067	9,067	7,532	7,195	5,863
Controls												
Grade Cohort FE	X	X	X	X	X	X	X	X	X	X	X	X
Race & Gender		X	X	X	X	X	X	X	X	X	X	X
Age at Application				X	X	X	X	X	X	X	X	X
Exclude Siblings							X	X	X	X	X	X
Immigrant & LEP ever					X	X	X	X	X	X	X	X
Neighborhoods					X	X	X	X	X	X	X	X
Disability Bus Need					X	X	X	X	X	X	X	X
Control for risk sets								X	X	X		X
Prenatal care adequacy											X	X
Family structure at birth											X	X
Parental education											X	X
Medicaid at birth											X	X
Applied before grade 1									X	X	X	X
Matched to birth records										X	X	X

Notes: This table displays the coefficient on METCO participation in fifth grade on individual fifth grade outcomes. Columns 1 and 2's sample includes fifth graders in Boston Public Schools, Boston charter schools, and METCO. The remaining columns include METCO applicants who applied before the first grade and attend a Massachusett public schools in fifth grade. Standard errors are in parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Appendix Table 12: Average School Types and Outcomes by METCO Offer Status

	Grade 4		Grade 7		Grade 9	
	Has offer by 1st grade (1)	No offer by 1st grade (2)	Has offer by 1st grade (3)	No offer by 1st grade (4)	Has offer by 1st grade (5)	No offer by 1st grade (6)
Panel A: School Enrollment Type						
METCO	0.72	0.06	0.64	0.07	0.61	0.08
BPS (includes exam schools)	0.10	0.37	0.09	0.27	0.10	0.27
Boston charter	0.02	0.09	0.07	0.16	0.06	0.12
Exam school	0.00	0.00	0.04	0.06	0.04	0.08
Moved to public school out of Boston & not a METCO suburb	0.05	0.15	0.06	0.17	0.07	0.18
Moved to a METCO suburb	0.02	0.04	0.03	0.04	0.03	0.04
Out of State or Private	0.09	0.30	0.11	0.29	0.13	0.30
Always out of state or private (up to and including this grade)	0.03	0.21	0.02	0.17	0.02	0.16
N	2214	6781	2214	6781	2214	6781
Panel B: SchoolX grade-cohort characteristics						
At least one parent graduated college	0.73	0.30	0.70	0.33	0.68	0.34
Parents married	0.84	0.51	0.82	0.55	0.82	0.56
Government paid for birth	0.15	0.48	0.17	0.44	0.18	0.44
Took SAT	0.55	0.47	0.59	0.53	0.70	0.62
AP took	0.47	0.34	0.50	0.41	0.55	0.43
N	2004	4693	1948	4650	1903	4604
Panel C: Average High School Outcomes						
Plan for 4-year college					0.81	0.62
Graduate high school in 4 years					0.91	0.80
Enroll in 4-year college					0.71	0.50
N					1903	4604
Graduate 4-year college					0.51	0.32
N					1903	4604

Notes: This table shows proportion of applicant that attend various types of schools by METCO offer status). Panel B shows the average outcomes for the schools that applicants enroll in by offer status. Grades 4, 7, and 9 show snapshots of elementary, middle, and high school traits.