Gifted or Gone: The Impacts of Gifted Education on Public School Enrollment and Achievement

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Abstract

Gifted education is a contested policy due to concerns about racial and socioeconomic inequities in identification procedures and unclear evidence of gifted programs' efficacy for improving student outcomes. In this context, New York City has provided PK to 2nd grade students the opportunity to apply for District and Citywide gifted and talented (GT) programs based upon meeting an eligibility test threshold. I evaluate the impacts of District and Citywide GT participation through regression discontinuity and lottery-based designs. I show that acceptance into a District or Citywide GT program induces non-NYC enrolled and already-NYC-enrolled wealthier, White, Asian, and Black applicants to enroll in public school compared to ineligible and non-offer receiving applicants. I also show that District and Citywide GT participation have positive effects on early grade absences, but imprecise effects on ELA and math achievement. This study highlights the need for districts to consider how specialized programs can be leveraged to attract families into public schools but can also separate students in public schools based upon ability, race, and class.

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1. Introduction

Public schools provide a spectrum of differentiated services to support students at different cognitive and academic skill levels. This spectrum includes the gifted education programs many school districts provide to students who are considered advanced relative to their grade or age cohort. Gifted education is undefined in federal law. Federal law acknowledges the potential for students to have advanced skills, but it does not provide requirements for identifying or serving these children. Gifted education is therefore a local option and definitions and services for gifted education vary from place to place. Common implementations of gifted education services include students pulled from the general education classroom or placement in separate programs in which students receive material considered more advanced than traditionally provided at the student's age or grade level. In some districts, gifted students are simply advanced to a higher grade level, as when a 3rd grade student advances to 5th grade instead of proceeding directly to 4th grade (National Association for Gifted Children, 2020).

Elementary gifted programs in the New York City Department of Education (NYC) provide the opportunity to study the short-term effects of gifted and talented education on early elementary students. NYC is distinctive for having GT programs that begin in kindergarten. Other prominent gifted programs and their accompanying research studies have been focused on programs that begin in later elementary (Card & Giuliano, 2014; Card & Giuliano, 2016; Cohodes, 2021), middle school (Bui, Craig, & Imberman, 2014), or high school (Abdulkadiroglu, Angrist, & Pathak, 2014). NYC is also distinctive for operating two types of gifted programs: District GT programs that function as gifted classrooms within larger schools while Citywide GT programs operate as specialized schools in which all students are gifted.

In this study, I use both regression discontinuity (RD) and lottery-based analytic strategies to provide the first causal estimates of the effects of NYC GT programs on enrollment in public elementary schools and the academic and behavioral outcomes of participating students. In the regression discontinuity strategy, using the eligibility test thresholds, I examine the outcomes between students who are barely eligible and receive and offer for, or enroll in, GT to those who are barely ineligible and do not receive an offer nor enroll. In the lottery-based strategy among eligible students, I compare the outcomes of those who receive an offer and enroll in GT to those who do not receive an offer nor enroll. Using both methods allows me to understand the effects of gifted education on both marginal and higher-performing students. In both designs, I find that receiving an offer for a gifted program induces non-NYC enrolled, wealthier, White, Asian, and Black students to either enroll or remain in NYC public schools. I also find that the gifted programs have imprecise effects on ELA and math achievement and absences. This study makes several other contributions to the economic literature on gifted education.

With this early elementary gifted program study, I contribute evidence on the effects of gifted education offers on public school enrollment. Two competing hypotheses exist for early elementary enrollment outcomes based upon student demographics. These effects could be smaller in elementary grades, given the ready availability of neighborhood public schools (i.e. elementary schools are smaller and cover a smaller geographic area and allow for more income-sorting) or effects could be larger in elementary grades given the increasing availability of non-public or public charter options and the nascent relationship with the public school system families with prekindergarten students have relative to later grade students where investment in the public system may be higher. Studying a program that begins at a younger age helps unpack

these competing hypotheses. In both the RD and lottery-based analysis, I find that receiving an offer for the GT programs induces families to enroll their students in NYC DOE schools. These enrollment effects are driven by prekindergarten applicants who are not enrolled in DOE schools when they apply for GT and among students enrolled in DOE schools when they apply, the effects are driven by higher-income, White, Asian, and Black students. These results suggest that GT programs attract families that otherwise choose non-public or charter options. Given the early age of the applicants in NYC relative to other gifted programs nationally, these results also highlight how enrollment outcomes can be connected to the age of the study sample. This finding extends previous research by Davis (2013) who find that there is a favorable effect of eligibility for an elementary gifted program on the retention in-district of more affluent students suggesting these families value gifted programs and the signal of their student being recognized as gifted and receiving specialized instruction. In their study of a middle school program, Bui et al (2014) also find that GT students are more likely to stay in the district, especially higher income students. Conversely, Cohodes (2020) does not find Boston's Advanced Work Class program affects enrollment, but the program begins in fourth grade when families have already navigated an arduous school enrollment process and may be invested in their child's school and is not a main transition point for students across school levels (e.g., PK to K, elementary to middle, middle to high school).

I also extend evidence of gifted education's effects on academic and behavioral outcomes. It is unclear whether an early elementary program might improve academic and behavioral outcomes that may not be affected by a later program start as early interventions are important for building strong academic skills. However, there could be a higher payoff to more rigorous, accelerated curricula in high schools. In both the RD and lottery-based analysis, I find that the

NYC District and Citywide GT programs have potentially positive, but imprecise effects on academic achievement while having positive effects on student attendance for students in poverty. These effects vary by outcome grade level. This contribution builds upon the emerging gifted education research that demonstrates academic and behavioral effects for gifted education are hard to discern. Card and Giuliano (2014) study a different large school district and finds few test score impacts for students identified as gifted by an IQ test. However, there are gains in math, reading, and science concentrated among lower-income and Black and Hispanic students for students who enroll in program classrooms through a universal screening method (Card and Giuliano 2016). Bui et al. (2014) uses regression discontinuity and randomized lottery for magnet gifted middle schools. The study shows that students in each analysis are exposed to higher achieving peers and a more advanced curriculum, but that achievement for marginal students neither improves nor worsens from gifted services in the short run. They also find that lottery winners only perform better in science. Cohodes (2020) studies Boston's Advanced Work Classes using regression discontinuity methods and shows this program has positive yet imprecise impacts on test scores and improves longer-term outcomes, increasing high school graduation and college enrollment with gains driven by Black and Latino students. Similarly, Abdulkadiroglu, Angrist, & Pathak (2014) use regression discontinuity to study elite secondary-level exam schools in Boston and New York City finds that applicants near admissions cutoffs for the least selective of these schools move from schools with scores near the bottom of the state SAT score distribution to schools with scores near the median while applicants near admissions cutoffs for the most selective of these schools move from above-average schools to schools with students whose scores fall in the extreme upper tail. Exam school students can also expect to

study with fewer nonwhite classmates. However, these changes in peer characteristics at exam school admissions cutoffs have little causal effect on test scores or college quality.

This paper proceeds as follows. Section II details the NYC GT program and admission policies that apply to this study, describes the outcomes, and examines the study sample. Section III provides the empirical strategy. Section IV provides results. Section V provides a series of robustness checks. Section VI provides a discussion and concludes.

2. Data

2.1 NYC GT Overview

This study is about the two types of gifted and talented (GT) programs NYC operated from 2010 through 2021. A combination of the inability for students to take the eligibility test during the COVID-19 pandemic and longstanding concerns that the NYC GT program excluded students of color and students from low-income backgrounds has led NYC DOE to explore a modification to the GT program beginning in the 2022-23 school year. These changes were made to expand the number of GT seats and diversify the GT program (New York City Department of Education, 2022). Previous evidence from New York has shown that Black and Hispanic students take the test for gifted admission at lower rates than their White and Asian counterparts (Lu & Weinberg, 2016; Lu & Weinberg, 2020). However, these authors find the disparity to be significantly less for those enrolled in public prekindergarten programs and suggest public prekindergarten enrollment plays a role in minimizing the gaps in test taking by providing greater access to information about the gifted programs across subgroups of students (Lu & Weinberg, 2016; Lu & Weingberg, 2020). Between 2010 and 2019, families were eligible to have their students take the GT eligibility test for enrollment in kindergarten, first, second, and third grade. Most applicants were prekindergarten students applying for kindergarten entry.

Fewer spots were available in subsequent grades. The NYC GT test uses both nonverbal and verbal tests to determine if a child is eligible to apply for GT programs. Students who scored at the 90th percentile or above on the eligibility test were eligible for District GT programs located within DOE elementary schools within certain districts. These programs also gave admissions priority to students who live in the same school district as the program, or the student had a sibling already attending the program. Citywide GT programs were eligible for students who scored at the 97th percentile or above on the eligibility test. These schoolwide programs accept students from across the city and do not give admissions priorities based on where students live but may if a student already has a sibling attending the program (New York City Department of Education, 2022). If a child was eligible for either program, their parents applied to GT based upon the specified deadline. Even if a child got the highest score possible on the GT test, an offer was not guaranteed. There were more applicants with scores of 99 than there were seats in some GT programs. In some cases, GT programs had seats that became available after offers were sent to families. Applicants who did not get an offer from their first-choice program were added to the waitlists of all the programs listed higher on their application than the program where they got an offer, or of all the programs they applied to if they got no offers (New York City Department of Education, 2022).

In NYC, students in District GT programs took classes together in major subject areas but might share classes such as physical education or art with students who were not in the GT program. Every student in the Citywide GT schools was in the GT program, and all courses were designed for GT students. Citywide programs are intended to provide students with curriculum that is a year-in-advance of the curriculum typical NYC students receive (Lu & Weinberg, 2016; Lu & Weinberg, 2020; New York City Department of Education, 2022).

2.2 Outcomes

Outcome measures link the records of applicants to their outcomes between 2010-11 to 2018-2019. Unless otherwise specified, all outcome data comes from NYC DOE. The following list summarizes the main study outcomes:

- Enrollment: Enrollment indicators track October enrollment at any NYC public school.
- Absences: Includes the number of days missed out of the total available days within a school year.
- New York State Assessment: Scale scores on the New York State Assessment in ELA and math. ELA and math are available in grades 3-8 while science is available in grades 4 and 8.

2.3 Sample

The study data includes all NYC GT applicants from 2010-11 to 2018-19. The RD and lottery-based analysis for academic and behavioral outcomes includes PK applicants from 2010-11 to 2014-15 given only these students reach 3rd grade by the end of the panel (e.g., 3rd grade test years 2014-15 to 2018-19).

Table 1 provides an overview of the GT admissions outcomes of GT applicants combining the cohorts between 2010-11 and 2018-19.[1] The largest group of applicants are PK students applying for K entry into a GT program. Between District and Citywide GT programs, the majority of offers and enrollments are for the District GT programs. Among PK applicants, 41.3% are eligible for District GT, 14.3% receive a District GT offer, 8.2% enroll in District GT, 26.7% are eligible for Citywide GT, 1.8% receive a Citywide GT offer, and 1.5% enroll in Citywide GT. Relative to PK applicants, applicants in grades K to 2 are increasingly less likely

[1] See Appendix Table 1 for typical grade progression of students in these grade cohorts.

to gain an offer and enroll in a District or Citywide GT program. This paper largely focuses on the outcomes of PK applicants as they represent the primary applicants for GT.

Table 1. GT Application Outcomes by Applicant Grade, 10-11 to 18-19

Table 2 compares the demographic characteristics of the subset of PK students who were enrolled in NYC public schools when they took the GT test to those of all PK students enrolled in NYC DOE. Among those PK students with demographic information available, GT test-takers and District and Citywide GT enrollees are more likely to be wealthier, White, and Asian relative to the overall NYC population. It is evident that GT enrollees are much higher performing than non-GT enrollees on future outcomes. Students in the District GT programs have ELA and Math scores that are typically more than one standard deviation above their PK cohort-based peers in 3rd grade while Citywide GT program enrollees have even higher 3rd grade standardized assessments scores. These estimates help to explain the perception that NYC's GT programs support student success, but these estimates do not account for selection into the programs. Of note, prior to the expansion of PK in fall 2014, almost half of NYC GT applicants were not enrolled in NYC PK. The proportion of non-NYC applicants declines after the PK expansion. For students not enrolled in NYC schools at the time of application, the GT application captures students' gender but not any additional demographic information.

Table 2. Summary Statistics of GT PK Applicants, 10-11 to 18-19

3. Empirical Strategy

3.1 Regression Discontinuity

My first empirical strategy is a Regression Discontinuity Instrumental Variables Model (RD) design (Lee & Lemieux, 2010; Gelman & Imbens, 2019). This RD analysis focuses on the

District GT program given the small number of students who enroll in a Citywide GT program relative to a District GT program. Not all students receive a GT offer as show in Table 1 and as with other threshold-based educational services (Abdulkadiroglu, Angrist, & Pathak, 2014; Bui, Craig, & Imberman, 2014; Cohodes, 2020). Additionally, some students who receive an offer do not enroll in GT. A raw comparison of students who enroll in GT with other NYC students would be misleading. Regression-based estimates of the GT program that adjust for observable student characteristics like baseline test scores cannot fully address this problem; if there are unobserved differences between GT students and other NYC students such as motivation or family interest in education, GT effects would confound with omitted variable bias. The RD estimates the local average treatment effect of providing gifted services to students who are on the District GT eligibility margin. This design compares the outcomes of students who enroll in a District GT program to those students who are ineligible and therefore do not receive an offer nor enroll at the eligibility threshold. The RD accounts for imperfect compliance in a two-stage least squares (2SLS) setup. To estimate the causal effect of GT on students' outcomes unconfounded by omitted variable bias, I compare students just above and just below the eligibility thresholds to form regression discontinuity estimates of GT's effect. Within a small window of points on an exam, students are in as good as random order such that comparing those above and below the threshold is comparable to randomized controlled trial. This RD analysis estimates the overall treatment effects of District GT being implemented at several locations across NYC DOE. For student *i*, the specification is as follows:

1) RF: $Y_{it+n} = \beta_0 + \beta_1 ABOVE_{it} + \beta_2 SCORE_{it} + \beta_3 ABOVE_{it} * SCORE_{it} + \alpha_t + \beta X_i + \epsilon_{it}$
2) 1st Stage: $ENROLL_{it+1} = \gamma_0 + \gamma_1 ABOVE_{it} + \gamma_2 SCORE_{it} + \gamma_3 ABOVE_{it} * SCORE_{it} + \alpha_t + \gamma X_i + \eta_{it}$

3) 2nd Stage: $Y_{it+n} = \delta_0 + \beta_1 \widehat{ENROLL}_{it+1} + \beta_2 SCORE_i + \beta_3 ABOVE * SCORE_i + \alpha_t + \delta X_i + \rho_{it}$

Y is the outcome of interest. ABOVE is a binary variable for being above the eligibility cutoff for a district program. SCORE is a student's eligibility score centered on the district or citywide eligibility cutoff. ABOVE*SCORE is an interaction between the two terms allowing for differing slopes on each side of the cutoff. ENROLL equals GT enrollment in t+1 after application. Note that ENROLL is substituted for OFFER equals GT offer after application for the NYC enrollment outcomes. α_t is year-fixed effects. For robustness checks including covariates, X_i is a vector for a student's available baseline demographic characteristics including NYC enrollment status, zone district, sex, race/ethnicity, poverty status, English learner status, disabilities status, age in months by September of the school year. My preferred model estimates a local linear regression with a triangular kernel on either side of the program cutoff (Calonico et al., 2014; Gelman & Imbens, 2019). The primary bandwidth of 10 is selected by using the procedures described in Calonico et al. (2017) and Calonico, Cattaneo, and Farrell (2018) across all outcomes for PK applicants and taking the average bandwidth for a more consistent sample (Cohodes, 2020). In the robustness section, estimates are provided with additional bandwidths (Calonico et al. 2017; Calonico et al. 2018; Cohodes, 2020; Chin, 2021). Standard errors are clustered on the applicant district and year.

I also report the control complier mean (CCM) as the mean outcome for students not eligible for the program. The CCM is the average outcome value for students below the threshold who are compliers. I adapt previous procedures for computing the CCM through the following equation (Abadie, 2002, 2003; Cohodes, 2020; Katz, Kling, & Liebman, 2001):

4) $Y_{it+n} * (1 - ENROLL_{it+1}) = \beta_0 + \beta_1 \left(1 - \widehat{ENROLL}_{it+1}\right) + \beta_2 SCORE_{it} + \beta_3 ABOVE_{it} * SCORE_{it} + \alpha_t + BX_i + \epsilon_{it}$

Where $1 - ENROLL_{it+1}$ is instrumented by GT eligibility as in the previous equation and B_1 is the estimate of the CCM.

3.2 Lottery-Based Analysis

I also provide a lottery-based specification for students above the District and Citywide GT eligibility thresholds to compare the outcomes of students who do and do not receive a District or Citywide GT offer and enroll. This analysis allows me to examine a higher-performing segment of the GT student application distribution. As noted in Section I above, eligible students can express preferences for GT programs while their test score and zoned district are considered for determining which students receive a GT offer to specific programs. As with the RD, this analysis estimates the overall treatment effects of District and Citywide GT being implemented at several locations across NYC DOE. I estimate the following model among District and Citywide GT eligible students. For student *i*, the specification is as follows:

5) RF: $Y_{ikt+n} = \beta_0 + \beta_1 OFFER_i + \xi_k + \alpha_t + BX_i + \epsilon_{ik}$

6) 1st Stage: $ENROLL_{ikt+1} = \gamma_0 + \gamma_1 OFFER_i + \xi_k + \alpha_t + \gamma X_i + \nu_{ik}$

7) 2nd Stage: $Y_{ikt+n} = \delta_0 + \delta_1 \widehat{ENROLL}_{it+} + \xi_k + \alpha_t + \delta X_i + \rho_{ik}$

Where OFFER equals District or Citywide GT offer, ENROLL equals District or Citywide GT enrollment in t+1. In this specification, ξ_k is a risk set composed of the student's ranked program preferences, zoned district, NYC enrollment status, and application test score. In regressions subset to NYC students, X is a vector for a student's available baseline demographic characteristics sex, race/ethnicity, poverty status, English learner status, disabilities status, and age in months by September of the school year. Standard errors are clustered on the applicant district and year. For District GT eligible students, the sample includes students with application scores of 90 to 96 while for Citywide GT eligible students the model is restricted to students with

scores of 97 to 99. Note that the reduced form specification is used for the NYC enrollment outcome in this analysis where OFFER predicts likelihood of enrollment in NYC kindergarten.

I also present the CCM for these results using a model aligned with the lottery-based analysis as follows:

8) $Y_{ikt+n} * (1 - ENROLL_{ikt+1}) = B_0 + B_1(1 - \widehat{ENROLL}_{ikt+1}) + \xi_k + \alpha_t + BX_i + \epsilon_{ikt}$

Where $1 - ENROLL_{ikt+1}$ is instrumented by GT offer as in the previous equation and B_1 is the estimate of the CCM.

4. Results

4.1 GT Offer and Enrollment

District GT RD Offer and Enrollment

I first provide evidence on the GT offer and enrollment rates of applicants. Estimates of District GT offer and enrollment are in Figure 1 and Table 3. No students below the threshold receive an official District GT offer. At the threshold there is a 43.2 percentage point increase in the share of students receiving an offer to enroll in District GT and a 20.9 percentage point increase in District GT enrollment. The RD LATE estimates of District GT enrollment conditional on GT offer is 48.5 percentage points. I use District GT Kindergarten enrollment in the following year as my endogenous predictor going forward. Offer and enrollment rates for subgroups are provided in appendix Figure A1 and Table A3.

District and Citywide GT Lottery-Based Offer and Enrollment

In addition to the RD estimates, I leverage available information about applicant program choice, offers, and enrollment to provide additional insight into the effects of GT participation for students above the eligibility threshold.

I first present the District GT enrollment rates conditional on offer in Table 3 Column 2. Among all applicants, 68.7% of those who receive an offer enroll in a District GT program. Of note, this is a larger up-take than at the District GT eligibility margin suggesting higher scoring applicants are more motivated to enroll in District GT than lower-scoring applicants. I also present the Citywide GT enrollment rates conditional on offer in Table 3 Column 3. Among all applicants, 80.8% of those who receive an offer enroll in a Citywide GT program. Again, this is a larger up-take than at the District GT eligibility margin and a larger take-up than for District GT among eligible students suggesting the Citywide program is more desirable among applicants. These estimates about take-up help validate the general perception of the NYC gifted programs as being in high demand, especially the specialized school setting in which Citywide GT operates.

Figure 1. District GT Offer and Enrollment, 10-11 to 18-19

Table 3. District and Citywide Offer and Enrollment, PK Applicants, 10-11 to 18-19

4.2 Kindergarten Enrollment

District GT RD

I next provide evidence on how District GT eligibility and offer affects student enrollment in NYC schools. For all PK applicants, reduced form estimates show a small jump in kindergarten NYC enrollment at the eligibility threshold of 3.0 percentage points as shown in Figure 2 and Table 4. RD LATE estimates of kindergarten enrollment conditional on District GT offer are 6.9 percentage points as shown in Table 5. Subgroup analyses show that non-NYC students, non-poverty, and White, Asian, and Black students are most likely to enroll in NYC kindergarten enrollment through GT eligibility and offer relative to NYC students, students in

poverty, and Hispanic students. This evidence suggests that overall higher-income students are more likely to explore other non-NYC public kindergarten options relative to other student groups. This evidence also suggests that there are families who explore enrollment in NYC schools only for the gifted education offerings as explored further below in discussing the demographics of students from the GT applicant sample who enter NYC K, but were not in NYC PK.

District and Citywide Lottery

I provide evidence on NYC enrollment for District GT eligible PK applicants in Table 4 Panel B and Citywide GT eligible PK applicants in Table 4 Panel C. As with the RD estimates at the District GT eligibility margin, higher-performing applicants are also more likely to enroll in NYC schools conditional on receiving a District or Citywide GT offer. The effects by subgroup mirror the effects through the RD model.

Figure 2. NYC Kindergarten Enrollment, PK Applicants, 10-11 to 14-15

Table 4. NYC Kindergarten Enrollment, PK Applicants, 10-11 to 14-15

Demographics of Students Who Enter NYC for Kindergarten

As noted earlier, NYC DOE only collects gender and zoned district information for non-NYC students during the application process but based upon the characteristics of applicants who later enter NYC public schools, it is higher-income, White, and Asian students, who drive the trend in enrollment in NYC kindergarten contingent on being eligible or receiving an offer for a District GT program.

Figure 3. NYC Kindergarten Demographics, Non-NYC PK Applicants, 10-11 to 14-15

Implications of Kindergarten Enrollment Effects

These enrollment effects reflect an important finding about the decisions families make about where to send their children to kindergarten and how these decisions vary based upon student economic and racial background. However, these results also highlight a potential concern for attrition in measuring downstream outcomes. The concern is that students differentially appear in the later data based on their eligibility for District GT, perhaps with those above the threshold more likely to stay in the district and those just below to choose options like charter or private schools. As noted, when presenting the kindergarten enrollment outcomes above, there are GT ineligible students who do not enroll in NYC schools or attrit from NYC schools. Substantively, because of the lack of information NYC DOE collects about applicants who are not enrolled in NYC schools when they apply for GT (gender, district, zoned district, application score), little can be said about differential attrition by different student groups among this sample.

Overall, I choose to limit analysis for later academic outcomes to the students in poverty subsample for whom there is no significant enrollment effect as the most conservative way to address attrition issues, although this decision reduces the generalizability of the findings to the subgroups for whom there is an enrollment effect. One potential benefit of results for this sample is that given general concerns about the performance of students from low-income backgrounds and their educational opportunities, this is a sample of students for whom we might be most interested in the effects of gifted education.

4.3 Grades K-7 Absences

District GT RD

I next explore how GT participation affects students' absence outcomes between eligible and ineligible students among the students in poverty subsample for applicants between 2010-11 to 2014-15. In reporting absences, I add one to each students' absences and log transform this number.[2] As shown in Figure 4 and Table 5, there is some evidence of reduction in absences in kindergarten in both the RD reduced form and LATE estimates. Overall, these reductions in absences are no longer significant beyond kindergarten.

Figure 4. Grade K- 7 Absences (Log+1), Students in Poverty, PK Applicants, 10-11 to 14-15

Table 5. Grade K- 7 Absences (Log+1), Students in Poverty, PK Applicants, 10-11 to 14-15

District and Citywide GT Lottery

I next provide evidence on how District GT participation affects absence outcomes through the District GT lottery sample of students in poverty who score 0 to 6 on the application test in Table 5 Panel B. As with the RD estimates, these lottery-based estimates comparing District GT enrollees and non-enrollees also suggest District GT enrollment reduces student absences, although the results are insignificant at the $p<0.05$ level. Additionally, I compare the outcomes of students who receive Citywide GT offers relative to the subsample of students in poverty who score 0 to 9 on the application test and find the Citywide program reduces absences although again not statistically significant.

[2] Poisson regression results are provided in the appendix Table AX.

4.4 Grades 3-7 ELA

District GT RD

I next provide evidence on how GT participation affects ELA outcomes. The first opportunity to examine the effect of the GT program on academic outcomes is through the New York Standardized Assessment offered in grades 3-8. I standardize the scores NYC within grade and year with a mean of zero and standard deviation of one. For PK applicants, estimates again include applicant cohorts 10-11 to 14-15. Each subsequent grade outcome represents one fewer cohort. Only the 10-11 PK cohort proceeds to 7^{th} grade by 2018-2019 the end of the panel.

It is important to note again that GT applicants are a very high scoring group with many students having elementary standardized scores that are a standard deviation above the mean among all NYC students as evident through the CCM for each ELA grade. I present both graphical and econometric evidence that District GT eligibility for marginal GT students has no discernible effects on achievement test scores after GT enrollment. Graphical evidence in Figure 5 shows no or small jumps in scores at the threshold in each applicant grade for ELA. Regression estimates corresponding to the figures are in Table 6. The RD LATE estimates conditional on District GT enrollment suggests positive effects, but these results are not significant at the $p<0.05$ level.

Figure 5. Grade 3-7 ELA SD Scores, Students in Poverty, PK Applicants, 10-11 to 14-15

Table 6. Grade 3-7 ELA SD Scores, Students in Poverty, PK Applicants, 10-11 to 14-15

District and Citywide GT Lottery

I next provide evidence on how District and Citywide GT participation affects ELA outcomes among eligible applicants in Tables 6 Panel B and Panel C. Again, for District GT, this

subsample includes students in poverty who score 0 to 6 on the application test, and for Citywide GT, this subsample includes students in poverty who score 0 to 9 on the application test. Unlike the District GT sample whose comparison group does not receive formal GT services, the comparison group for Citywide GT enrollees is both high-scoring District GT enrollees and non-GT enrollees. For both comparisons being made, the results are imprecise and do not lead to meaningful conclusions about the impacts of District and Citywide GT on ELA among this high-scoring sample.

4.5 Grades 3-7 Math

District GT RD

I next provide evidence on how GT participation affects math outcomes. Again, for PK applicants, estimates include applicant cohorts 10-11 to 14-15. As with ELA, the math CCM highlights the District GT applicants are much higher scoring on math than their district peers. As with ELA, graphical evidence in Figure 6 shows no or small jumps in scores at the threshold in each applicant grade for math. The RD LATE estimates conditional on District GT enrollment suggests some positive effects, but these results are also not significant at the $p<0.05$ level as shown in Figure and Table 7 Panel A.

Figure 6. Grade 3-7 Math SD Scores, Students in Poverty, PK Applicants, 10-11 to 14-15

Table 7. Grade 3-7 Math SD Scores, Students in Poverty, PK Applicants, 10-11 to 14-15

District and Citywide GT Lottery

I next provide evidence on how District and Citywide GT participation affects math outcomes among eligible applicants in Tables 7 Panel B and Panel C. I next provide evidence on how District and Citywide GT participation affects ELA outcomes among eligible applicants in

Tables 6 Panel B and Panel C. Again for District GT, this subsample includes students in poverty who score 0 to 6 on the application test, and for Citywide GT, this subsample includes students in poverty who score 0 to 9 on the application test. As with ELA, for both comparisons being made, the results are imprecise and do not lead to meaningful conclusions about the impacts of District and Citywide GT on math among this high-scoring sample.

5. Robustness Checks

5.1 District GT RD

I employ a series of robustness checks for RD design. These checks include the density of the running variable, and density of student demographic characteristics, inclusion of covariates, and alternative bandwidths. The density of the running variable and student demographic characteristics information are available in the appendix as Figures A3 and A4.

I report the District GT RD results with covariates for the students in poverty subsample in appendix Table A4.

For the District GT RD estimates, I report estimates for two additional sets of bandwidths at 5, and 15 for the students in poverty subgroup. The details on various bandwidths are in appendix Figure A5 and follows a pattern of larger but less precise impacts for smaller bandwidths. Overall, the bandwidth and specification details are consistent with the main findings.

5.2 District GT Lottery-Based Analysis

I provide estimates for the District GT lottery incorporating various covariate specifications for the students in poverty subsample. In appendix Table A5 these estimates are for the first outcome grade for each outcome corresponding to the largest sample size. These

specifications provide estimates directionally in line with the baseline specification, but some estimates that do not include the full set of covariates vary in magnitude and direction depending on the outcome.

6. Discussion and Conclusion

My analysis has examined local average treatment effects of the District and Citywide GT programs using RD and lottery-based designs. In both designs I find that offering GT programs for high-achieving students for kindergarten entrance can increase the enrollment of these students in NYC schools. Through the RD, I show that the District GT program reduces student absences and then neither harms nor improves the academic outcomes of marginally eligible participating students. I show that the RD approaches behind these causally identified effects are robust to several specifications. There are a few potential reasons I do not see significant achievement impacts on marginal students. First, the attrition from the sample limits the ability to measure later outcomes for a broader array of students. Additionally, for students who do enroll in NYC, it is possible that the District GT program (or providing more intensive services) has a positive effect, but additional support for the students who do not qualify from teachers or other sources may offset the effect. Such additional support could result from informal mechanisms, such as more time investment by the parent in the child's schooling, or more formal pathways such as additional tutoring or enrichment activities. An additional explanation is based upon the observation that entering GT potentially reduces a student's relative ranking within the class (Abdulkadiroglu et al., 2014, Bui et al. 2014; Cohodes, 2020). In this case, teachers may target the material in their classes to the median or higher achieving students. It is this hypothesis that aligns most closely with the lottery-based analysis that focuses on students away from the margin and finds some evidence of positive effects. The lottery-based

analysis among the eligible students shows that District GT enrollment may have small positive effects while the Citywide GT program has negligible effects. The effects of the Citywide GT program are difficult to discern as the program is relatively small and because the comparisons to students who do not enroll in Citywide GT comingle students who enroll in a District GT program or no GT program.

Overall, this paper highlights how specialized programs like gifted education can serve as an important vehicle to both attract and retain students within a competitive early education market. Like many urban school districts, NYC has faced competition from charter schools, private schools, and overall declining enrollment. As noted in other studies, GT is one program that might attract families to the district or encourage them to stay (Davis, 2013; Bui et al., 2014; Cohodes, 2020). Between 2010 and 2017 there are thousands of students who do not enroll in NYC kindergarten after taking the GT application test who may have enrolled if provided a GT slot. NYC sets the boundaries for GT supply and eligibility. If NYC has a goal to keep as many students as possible, and if parents (and/or students) have a high demand for GT program participation, it may be optimal for NYC to expand participation if it does no educational harm. This approach would potentially keep higher-performing and more affluent families engaged in NYC schools. However, some individuals might argue that retaining these students and keeping them separate from the larger student body in NYC may not be sufficient for integrating students from diverse backgrounds. Additionally, gifted education programs may benefit students, but more research is necessary to help us better understand aggregate behavioral and academic effects and then the specific curriculum and pedagogy to use to produce the greatest student results.

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llText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)

8. Tables & Figures

Table 1. GT Application Outcomes by Applicant Grade, 10-11 to 18-19

	1	2	3	4	5	6
Panel A. PK	District Eligible	District Offer	District Enroll	Citywide Eligible	Citywide Offer	Citywide Enroll
Mean	0.413	0.143	0.082	0.267	0.019	0.015
N	137742	137742	137742	137742	137742	137742
Panel B. K						
Mean	0.299	0.106	0.0563	0.127	0.006	0.004
N	78213	78213	78213	78213	78213	78213
Panel C. 1						
Mean	0.260	0.057	0.028	0.093	0.003	0.002
N	57230	57230	57230	57230	57230	57230
Panel D. 2						
Mean	0.285	0.052	0.026	0.111	0.003	0.002
N	47203	47203	47203	47203	47203	47203

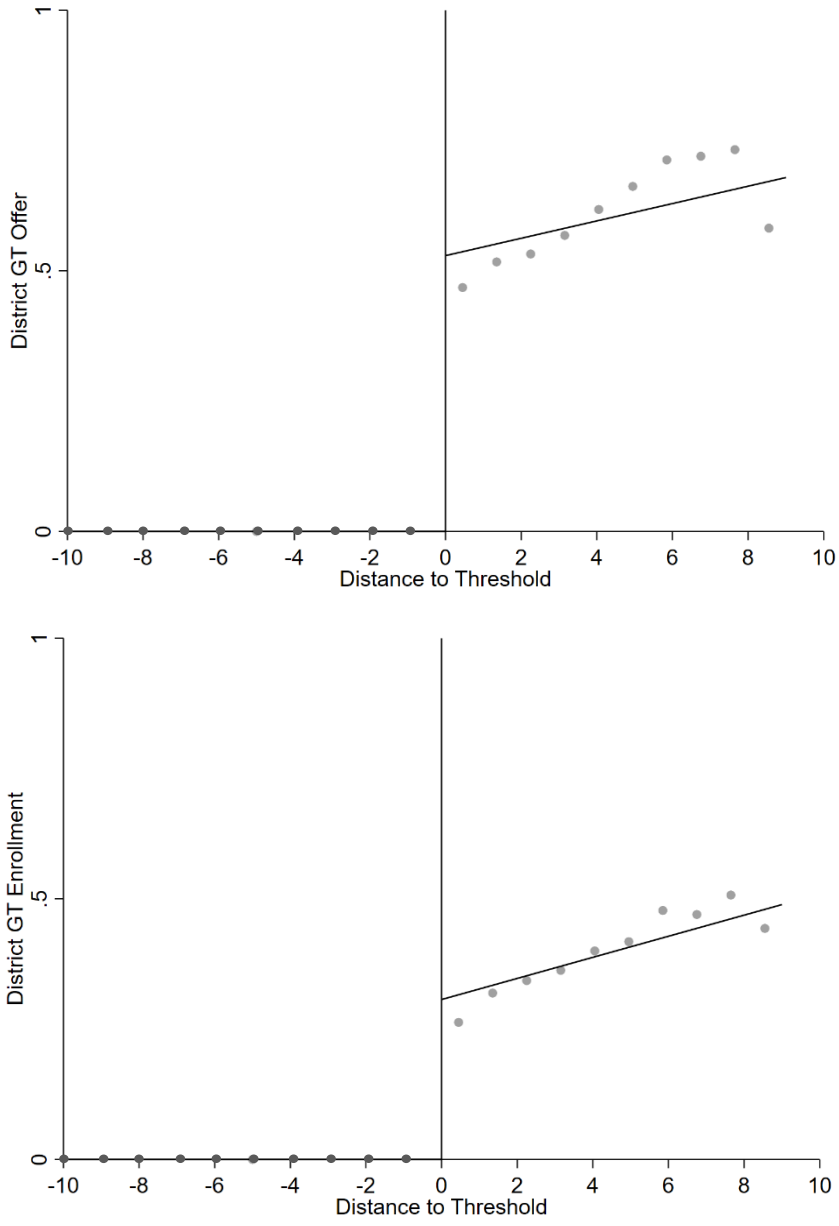
Notes: Mean of each variable are shown based upon total applicant sample.
Source: Author's calculations and NYC DOE data.

Table 2. Summary Statistics of GT PK Applicants, 10-11 to 18-19

	1	2	3	4	5	6	7	8
	All	GT Test-Takers	District Eligible	District Offer	District Enrollee	Citywide Eligible	Citywide Offer	Citywide Enrollee
NYC PK		0.57	0.52	0.51	0.57	0.53	0.39	0.42
Male	0.49	0.47	0.48	0.48	0.48	0.47	0.48	0.47
Poverty	0.55	0.38	0.35	0.24	0.24	0.41	0.17	0.17
English Learner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Special Ed.	0.09	0.06	0.05	0.04	0.04	0.06	0.05	0.05
White	0.20	0.24	0.27	0.32	0.33	0.25	0.40	0.41
Asian	0.16	0.24	0.24	0.32	0.37	0.20	0.27	0.28
Black	0.23	0.18	0.15	0.09	0.09	0.19	0.07	0.06
Hispanic	0.37	0.19	0.18	0.11	0.11	0.21	0.08	0.08
Months	50.39	50.77	50.80	51.08	51.13	50.70	51.50	51.45
3rd ELA (SD)	0.12	0.77	0.98	1.23	1.27	0.89	1.34	1.35
3rd Math (SD)	0.10	0.77	1.00	1.28	1.31	0.89	1.40	1.40
District Score	-21.63	-18.53	5.50	5.73	5.97	8.31	8.86	8.85
N	523677	137742	56935	19738	11339	36729	2589	2019

Notes: Mean values for summary statistics comparing the demographic characteristics of all NYC PK students to PK GT Applicants with demographic information available at time of application. 3rd grade ELA and Math scores are for applicants from 10-11 to 14-15.
Source: Author's calculations and NYC DOE data.

Figure 1. Estimates of District GT Offer and Enrollment, PK Applicants, 10-11 to 18-19



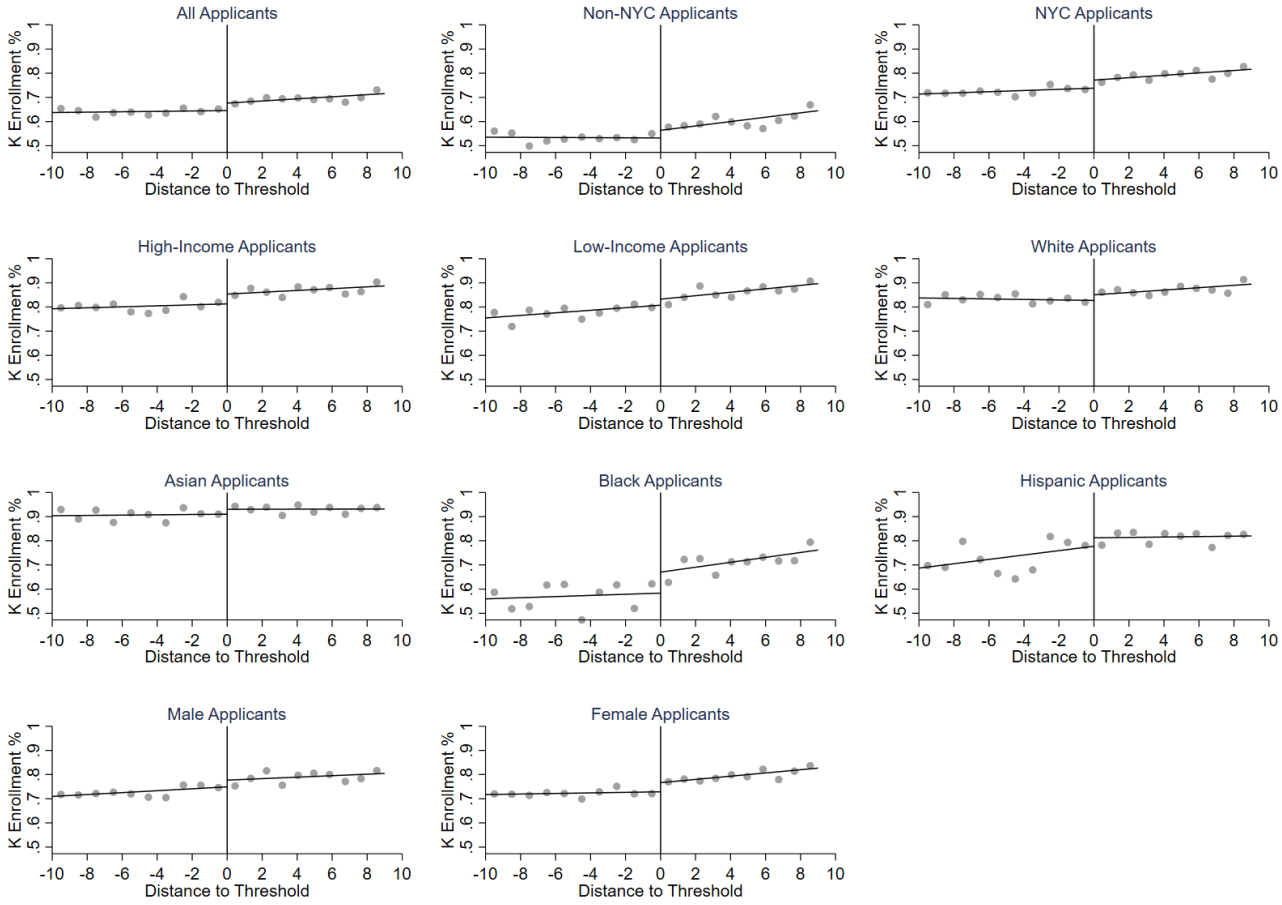
Notes: This figure shows average District GT offer and enrollment outcomes for bins of width 1 on either side of the threshold for all students within the bandwidth of 10 around the eligibility threshold. No students below the threshold are recorded as receiving a formal offer or enrollment. A linear fit line is on both sides of the threshold.
Source: Author's calculations and NYC DOE data.

Table 3. District and Citywide Offer and Enrollment, PK Applicants, 10-11 to 18-19

	1	2	2
	District GT Enrollment RD	District GT Enrollment Lottery	Citywide GT Enrollment Lottery
Offer	0.485+	0.687+	0.808+
	(0.019)	(0.02)	(0.015)
RF: Above	0.209+		
	(0.015)		
1st	0.432+		
	(0.024)		
N	53,373	14,915	7,990
Centered Score Included	(-10,10)	(0,6)	(7,9)

*Notes: Column 1) The coefficient labeled "RF" is the reduced form estimate from an indicator for scoring above the District GT qualification threshold on District GT enrollment. The coefficient labeled "Offer" is a 2SLS indicator for receiving a District GT offer on District GT enrollment. Each coefficient labeled "First" is a first stage estimate for scoring above the threshold and receiving an offer. All regressions include year fixed effects. Each coefficient is generated by local linear regression with a triangular kernel of bandwidth 10. Columns 2 and 3) The coefficient labeled "Offer" is the reduced form estimate from an indicator for receiving a District or Citywide GT offer on District or Citywide GT enrollment. The sample includes applicants from 10-11 to 14-15. Robust standard errors clustered by baseline district by year are in parentheses. + p<0.01, ~ p<0.05, * p<0.1*
Source: Author's calculations and NYC DOE data.

Figure 2. NYC Kindergarten Enrollment, PK Applicants, 10-11 to 18-19



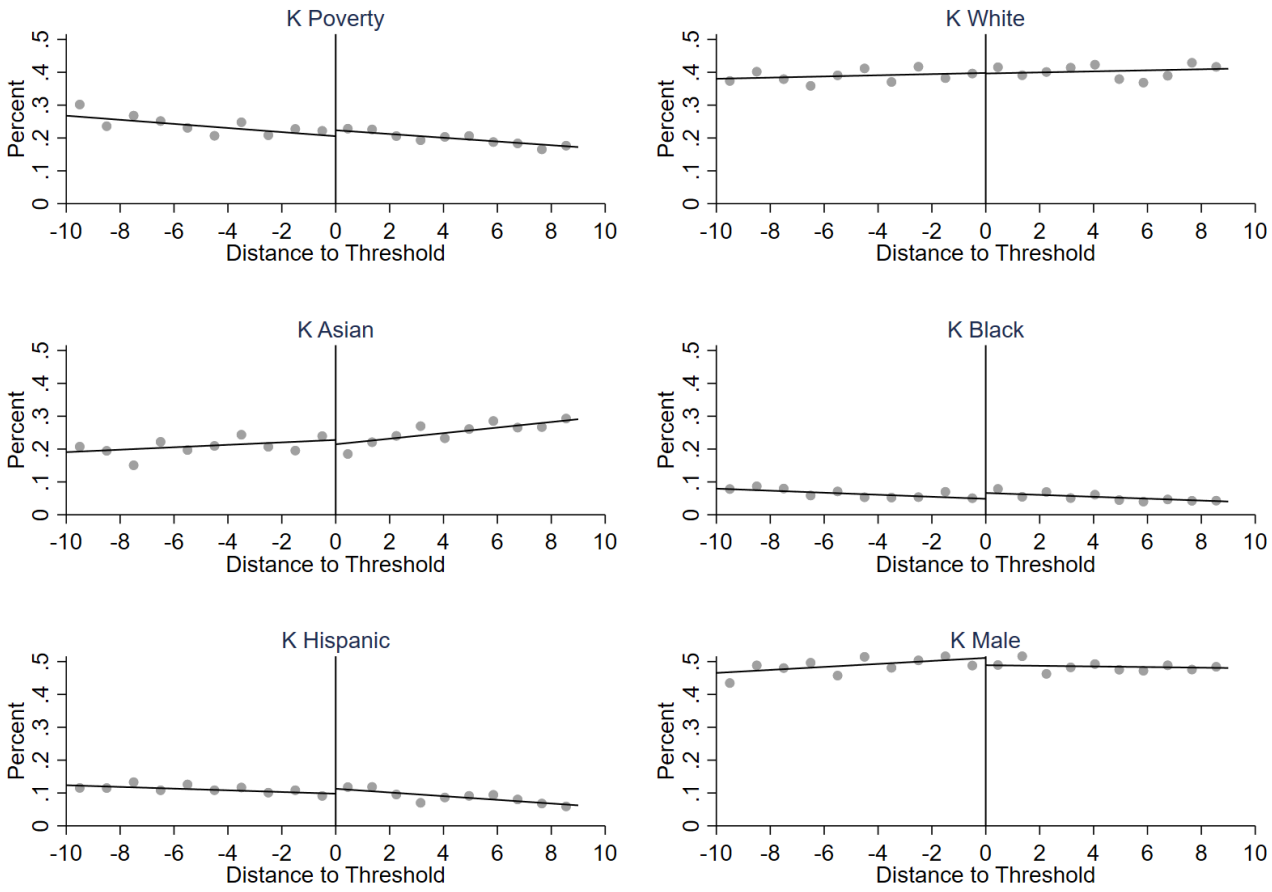
Notes: This figure shows average NYC enrollment outcomes for bins of width 1 on either side of the threshold for all students within the bandwidth of 10 around the eligibility threshold. A linear fit line is on both sides of the threshold. The sample includes applicants from 10-11 to 18-19.
Source: Author's calculations and NYC DOE data.

Table 4. NYC Kindergarten Enrollment, PK Applicants, 10-11 to 18-19

	1	2	3	4	5	6	7	8	9
	All	Not NY	NY	Not Pov.	Pov.	White	Asian	Black	Hisp.
Panel A. District GT RD									
LATE	0.069+	0.086~	0.070~	0.087+	0.035	0.099*	0.034	0.123~	0.009
	(0.024)	(0.037)	(0.027)	(0.031)	(0.037)	(0.053)	(0.030)	(0.061)	(0.062)
RF	0.030+	0.034~	0.032~	0.036+	0.020	0.037*	0.016	0.083~	0.004
	(0.010)	(0.015)	(0.013)	(0.013)	(0.021)	(0.020)	(0.014)	(0.042)	(0.029)
1st	0.432+	0.398+	0.459+	0.421+	0.558+	0.375+	0.466+	0.674+	0.466+
	(0.024)	(0.030)	(0.024)	(0.025)	(0.031)	(0.029)	(0.036)	(0.029)	(0.033)
CCM	0.689+	0.611+	0.732+	0.818+	0.834+	0.821+	0.910+	0.643+	0.855+
	(0.023)	(0.036)	(0.026)	(0.030)	(0.034)	(0.050)	(0.027)	(0.053)	(0.057)
N	53373	26895	26478	17879	5775	8606	7689	2613	3430
Panel B. District GT Lottery									
Offer	0.060+	0.114+	0.023	0.035~	0.066*	0.074+	0.014	0.353+	0.066
	(0.015)	(0.029)	(0.015)	(0.016)	(0.034)	(0.025)	(0.017)	(0.123)	(0.062)
CCM	0.745+	0.629+	0.828+	0.896+	0.864+	0.866+	0.943+	0.809+	0.856+
	(0.015)	(0.023)	(0.013)	(0.013)	(0.030)	(0.020)	(0.013)	(0.275)	(0.053)
N	14915	7151	7102	4733	1135	2245	1831	464	714
Panel C. Citywide GT Lottery									
Offer	0.180+	0.201+	0.116+	0.096+	-0.080	0.078~	0.028	0.131	0.564~
	(0.017)	(0.020)	(0.029)	(0.026)	(0.134)	(0.034)	(0.067)	(0.492)	(0.253)
CCM	0.622+	0.560+	0.773+	0.850+	1.031+	0.862+	0.912+	0.869*	0.436*
	(0.016)	(0.021)	(0.026)	(0.024)	(0.120)	(0.033)	(0.061)	(0.492)	(0.253)
N	7990	4622	2704	1901	273	1037	532	111	126

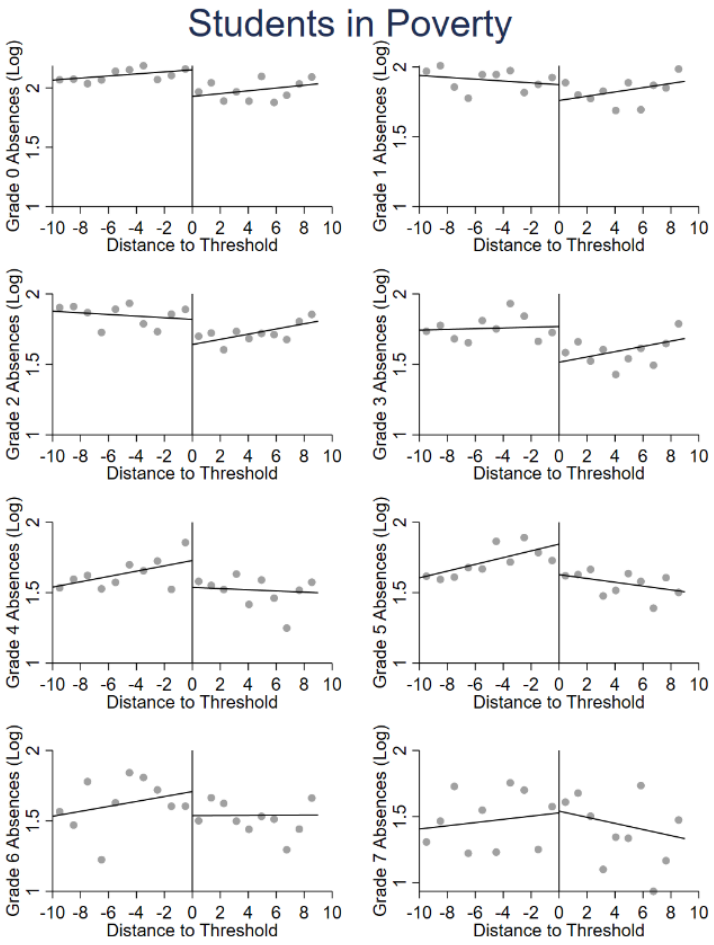
*Notes: Panel A) Each coefficient labeled "RF" is the reduced form estimate from an indicator for scoring above the District GT qualification threshold on NYC kindergarten enrollment. Each coefficient labeled "LATE" is a 2SLS indicator for receiving a District GT offer on NYC Kindergarten enrollment. Each coefficient labeled "First" is a first stage estimate for scoring above the threshold and receiving an offer. All regressions include year fixed effects. Each coefficient is generated by local linear regression with a triangular kernel of bandwidth 10. Panels B and C) Each coefficient labeled "Offer" is the reduced form estimate from an indicator for receiving an offer on NYC kindergarten enrollment. Panel B includes applicant scores 0 to 6 while Panel C includes applicant scores 7 to 9. All regressions include student zoned district, NYC enrollment status, and gender. "CCM" is the control complier mean. The sample includes applicants from 10-11 to 18-19. Robust standard errors clustered by baseline district by year are in parentheses. + p<0.01, ~ p<0.05, * p<0.1*
Source: Author's calculations and NYC DOE data.

Figure 3. NYC Kindergarten Demographics, Non-NYC PK Applicants, 10-11 to 18-19



Notes: This figure shows average NYC kindergarten race/ethnicity characteristics for bins of width 1 on either side of the threshold for all non-NYC students within the bandwidth of 10 around the eligibility threshold. A linear fit line is on both sides of the threshold.
Source: Author's calculations and NYC DOE data.

Figure 4. Grades K-7 Absences (Log+1),
Students in Poverty, PK Applicants, 10-11 to 14-15



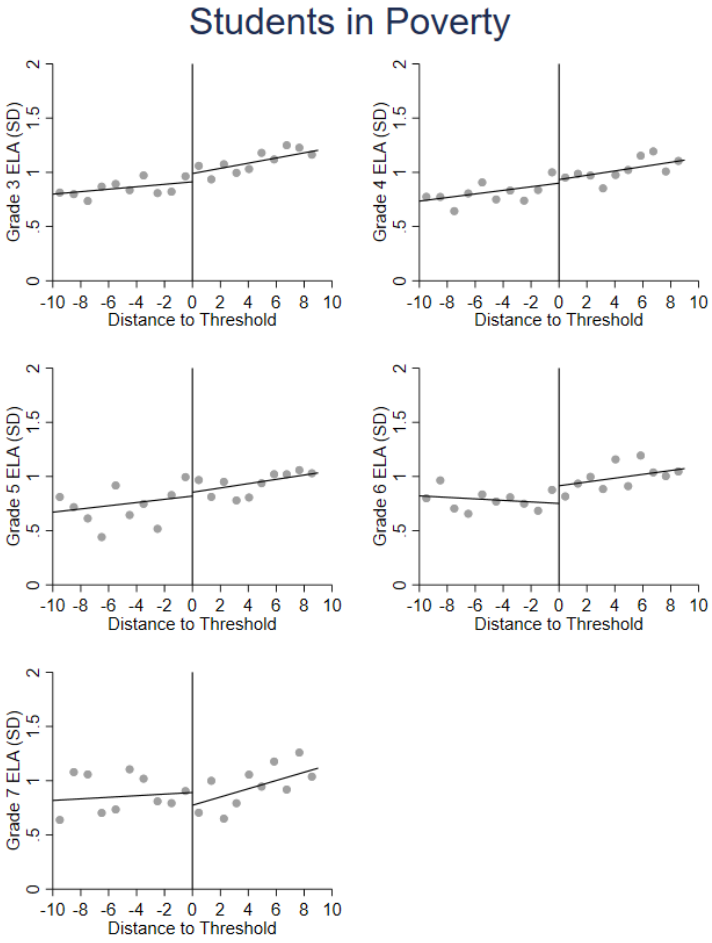
Notes: This figure shows average absences (log) outcomes for bins of width 1 on either side of the threshold for all students within the bandwidth of 10 around the eligibility threshold. A linear fit line is on both sides of the threshold.
Source: Author's calculations and NYC DOE data.

Table 5. Grades K-7 Absences (Log+1),
Students in Poverty, PK Applicants, 10-11 to 14-15

	1	2	3	4	5	6	7	8
	K	1	2	3	4	5	6	7
Panel A. District GT RD								
LATE	-0.368~	-0.189	-0.374~	-0.342~	-0.414	-0.446	-0.214	0.258
	(0.160)	(0.151)	(0.157)	(0.188)	(0.256)	(0.295)	(0.436)	(0.673)
RF	-0.186~	-0.095	-0.185~	-0.169*	-0.191	-0.191	-0.092	0.101
	(0.080)	(0.076)	(0.077)	(0.093)	(0.118)	(0.125)	(0.190)	(0.264)
1st	0.507+	0.502+	0.502+	0.495+	0.460+	0.427+	0.430+	0.391+
	(0.029)	(0.030)	(0.030)	(0.033)	(0.037)	(0.043)	(0.063)	(0.074)
CCM	2.186+	1.841+	1.924+	1.772+	1.842+	1.937+	1.596+	0.739
	(0.161)	(0.140)	(0.150)	(0.185)	(0.227)	(0.285)	(0.441)	(0.627)
N	2643	2552	2450	2367	1667	1082	606	336
Panel B. District GT Lottery								
LATE	-0.020	-0.330	-0.317	-0.022	-0.169	-0.277	0.046	
	(0.321)	(0.261)	(0.298)	(0.393)	(0.380)	(0.428)	(0.471)	
RF	-0.017	-0.276	-0.260	-0.019	-0.143	-0.253	0.036	
	(0.270)	(0.220)	(0.240)	(0.334)	(0.317)	(0.390)	(0.381)	
1st	0.839+	0.838+	0.819+	0.849+	0.849+	0.916+	0.797~	
	(0.067)	(0.070)	(0.085)	(0.087)	(0.101)	(0.109)	(0.307)	
CCM	1.914+	1.858+	1.786+	1.612+	1.733+	1.852+	1.159~	
	(0.258)	(0.178)	(0.232)	(0.299)	(0.389)	(0.363)	(0.545)	
N	472	448	421	398	297	210	144	
Panel C. Citywide GT Lottery								
LATE	-0.189	-0.896~	-0.106	-0.633~	-0.444			
	(0.226)	(0.392)	(0.308)	(0.265)	(0.359)			
RF	-0.179	-0.833~	-0.096	-0.566~	-0.394			
	(0.213)	(0.371)	(0.281)	(0.244)	(0.318)			
1st	0.946+	0.929+	0.909+	0.895+	0.889+			
	(0.046)	(0.058)	(0.065)	(0.072)	(0.069)			
CCM	2.473+	2.461+	2.040+	2.550+	2.142+			
	(0.177)	(0.219)	(0.284)	(0.268)	(0.367)			
N	1264	1005	784	547	414			

*Notes: Panel A) Each coefficient labeled "RF" is the reduced form estimate from an indicator for scoring above the District GT qualification threshold on the outcome. Each coefficient labeled "LATE" is a 2SLS indicator for District GT enrollment on the outcome. Each coefficient labeled "First" is a first stage estimate for scoring above the threshold and enrolling in District GT. All regressions include year fixed effects. Each coefficient is generated by local linear regression with a triangular kernel of bandwidth 10. Panels B and C) Each coefficient labeled "RF" is the reduced form estimate from an indicator for receiving an offer on the outcome. Each coefficient labeled "LATE" is a 2SLS indicator for GT enrollment on the outcome. Each coefficient labeled "First" is a first stage estimate for receiving an offer. All regressions include student choice set, zoned district, NYC enrollment status, and student demographics. "CCM" is the control complier mean. The sample includes applicants from 10-11 to 14-15. Panel B includes applicant scores 0 to 6 while Panel C includes applicant scores 0 to 9. Robust standard errors clustered by baseline district by year are in parentheses. + p<0.01, ~ p<0.05, * p<0.1*
Source: Author's calculations and NYC DOE data.

Figure 5. Grades 3- 7 ELA (SD),
Students in Poverty, PK Applicants, 10-11 to 14-15



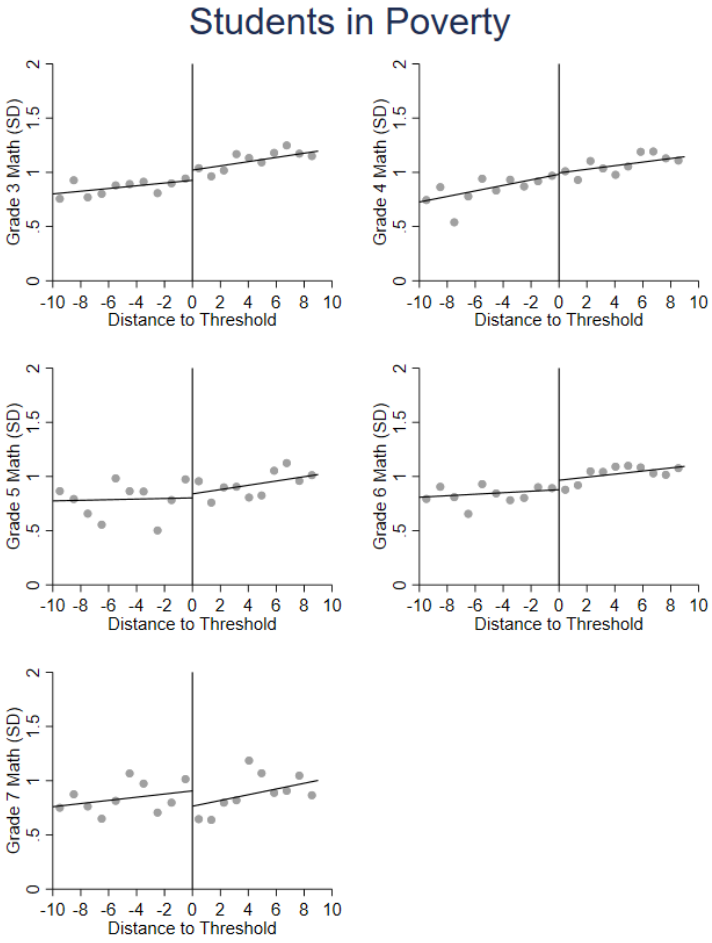
Notes: This figure shows average ELA outcomes for bins of width 1 on either side of the threshold for all students within the bandwidth of 10 around the eligibility threshold. A linear fit line is on both sides of the threshold.
Source: Author's calculations and NYC DOE data.

Table 6. Grades 3-7 ELA (SD),
Students in Poverty, PK Applicants, 10-11 to 14-15

	1	2	3	4	5
	3	4	5	6	7
Panel A. District GT RD					
LATE	0.150	0.019	-0.073	0.262	-0.225
	(0.145)	(0.178)	(0.205)	(0.276)	(0.342)
RF	0.075	0.009	-0.031	0.109	-0.091
	(0.074)	(0.083)	(0.088)	(0.116)	(0.138)
1st	0.503+	0.466+	0.426+	0.415+	0.405+
	(0.033)	(0.037)	(0.044)	(0.064)	(0.074)
CCM	0.934+	0.986+	1.019+	0.651+	0.856+
	(0.126)	(0.152)	(0.177)	(0.208)	(0.281)
N	2288	1616	1050	584	322
Panel B. District GT Lottery					
LATE	0.272	-0.0701	-0.0182	-0.770	
	(0.261)	(0.319)	(0.299)	(0.772)	
RF	0.231	-0.0595	-0.0170	-0.654	
	(0.225)	(0.270)	(0.278)	(0.770)	
1st	0.850+	0.849+	0.932+	0.849+	
	(0.0903)	(0.103)	(0.111)	(0.301)	
CCM	1.187+	1.398+	1.145+	2.005+	
	(0.215)	(0.234)	(0.337)	(0.450)	
N	385	287	201	141	
Panel C. Citywide GT Lottery					
LATE	-0.696	0.159			
	(0.500)	(0.444)			
RF	-0.612	0.138			
	(0.409)	(0.384)			
1st	0.880+	0.869+			
	(0.080)	(0.079)			
CCM	1.927+	0.921+			
	(0.468)	(0.331)			
N	528	397			

*threshold on the outcome. Each coefficient labeled "LATE" is a 2SLS indicator for District GT enrollment on the outcome. Each coefficient labeled "First" is a first stage estimate for scoring above the threshold and enrolling in District GT. All regressions include year fixed effects. Each coefficient is generated by local linear regression with a triangular kernel of bandwidth 10. Panels B and C) Each coefficient labeled "RF" is the reduced form estimate from an indicator for receiving an offer on the outcome. Each coefficient labeled "LATE" is a 2SLS indicator for GT enrollment on the outcome. Each coefficient labeled "First" is a first stage estimate for receiving an offer. All regressions include student choice set, zoned district, NYC enrollment status, and student demographics. "CCM" is the control complier mean. The sample includes applicants from 10-11 to 14-15. Panel B includes applicant scores 0 to 6 while Panel C includes applicant scores 0 to 9. Robust standard errors clustered by baseline district by year are in parentheses. + p<0.01, ~ p<0.05, * p<0.1*
Source: Author's calculations and NYC DOE data.

Figure 6. Grade 3-7 Math (SD),
Students in Poverty, PK Applicants, 10-11 to 14-15



Notes: This figure shows average math outcomes for bins of width 1 on either side of the threshold for all students within the bandwidth of 10 around the eligibility threshold. A linear fit is imposed on either side of the threshold.
Source: Author's calculations and NYC DOE data.

Table 7. Grade 3-7 Math (SD),
Students in Poverty, PK Applicants, 10-11 to 14-15

	1	2	3	4	5
	3	4	5	6	7
Panel A. District GT RD					
LATE	0.149	0.010	0.013	0.097	-0.596
	(0.146)	(0.185)	(0.252)	(0.387)	(0.511)
RF	0.074	0.005	0.006	0.040	-0.234
	(0.073)	(0.086)	(0.107)	(0.162)	(0.187)
1st	0.498+	0.463+	0.420+	0.411+	0.393+
	(0.033)	(0.037)	(0.045)	(0.065)	(0.077)
CCM	0.990+	1.124+	0.992+	1.004+	1.457+
	(0.138)	(0.167)	(0.213)	(0.352)	(0.439)
N	2286	1616	1047	578	316
Panel B. District GT Lottery					
LATE	-0.020	0.121	0.0350	0.459	
	(0.238)	(0.248)	(0.425)	(0.664)	
RF	-0.017	0.103	0.0321	0.381	
	(0.202)	(0.212)	(0.389)	(0.471)	
1st	0.848+	0.852+	0.915+	0.830~	
	(0.093)	(0.103)	(0.115)	(0.321)	
CCM	1.318+	1.338+	1.380+	1.227+	
	(0.206)	(0.184)	(0.328)	(0.392)	
N	385	287	199	139	
Panel C. Citywide GT Lottery					
LATE	-0.083	-0.088			
	(0.314)	(0.468)			
RF	-0.073	-0.077			
	(0.275)	(0.405)			
1st	0.879+	0.869+			
	(0.082)	(0.079)			
CCM	1.414+	1.225+			
	(0.309)	(0.317)			
N	528	397			

*threshold on the outcome. Each coefficient labeled "LATE" is a 2SLS indicator for District GT enrollment on the outcome. Each coefficient labeled "First" is a first stage estimate for scoring above the threshold and enrolling in District GT. All regressions include year fixed effects. Each coefficient is generated by local linear regression with a triangular kernel of bandwidth 10. Panels B and C) Each coefficient labeled "RF" is the reduced form estimate from an indicator for receiving an offer on the outcome. Each coefficient labeled "LATE" is a 2SLS indicator for GT enrollment on the outcome. Each coefficient labeled "First" is a first stage estimate for receiving an offer. All regressions include student choice set, zoned district, NYC enrollment status, and student demographics. "CCM" is the control complier mean. The sample includes applicants from 10-11 to 14-15. Panel B includes applicant scores 0 to 6 while Panel C includes applicant scores 0 to 9. Robust standard errors clustered by baseline district by year are in parentheses. + p<0.01, ~ p<0.05, * p<0.1*
Source: Author's calculations and NYC DOE data.

10. Online Appendix

Table A1. Applicant Cohorts and Typical Grade Progression

Academic Year		Applicant Cohorts and Typical Grade Progression						
2010	2011	PK						
2011	2012	K	PK					
2012	2013	1	K	PK				
2013	2014	2	1	K	PK			
2014	2015	3	2	1	K	PK		
2015	2016	4	3	2	1	K	PK	
2016	2017	5	4	3	2	1	K	PK
2017	2018	6	5	4	3	2	1	K
2018	2019	7	6	5	4	3	2	1

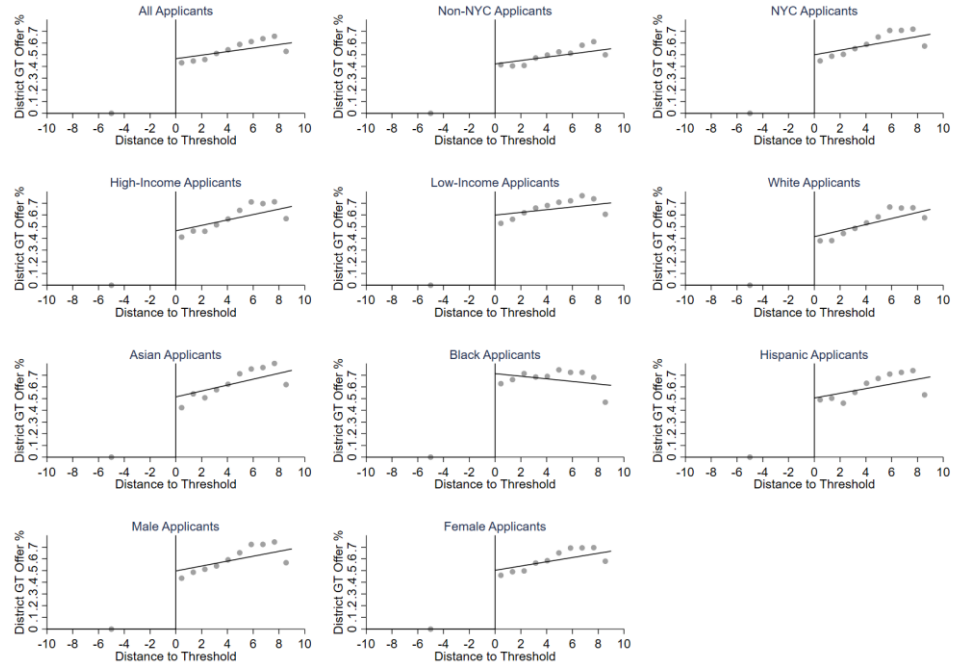
Table A2. District GT RD, MSE−Optimal Bandwidth by Outcome, Full Sample

Variable	Grade	Bandwidth
Enrollment	K	10.21
ELA	3	10.70
	4	11.29
	5	10.93
	6	9.93
	7	8.88
Math	3	9.00
	4	9.06
	5	7.20
	6	7.48
	7	9.49
Absences	K	9.34
	1	12.39
	2	11.58
	3	10.57
	4	12.00
	5	9.06
	6	11.69
	7	11.51
Average		10.12

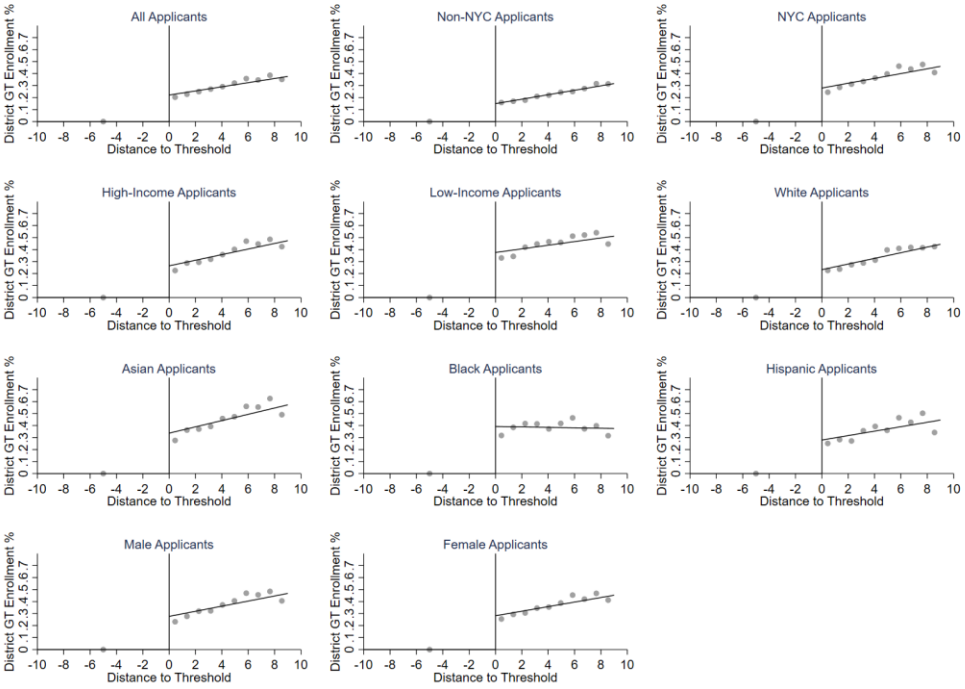
Notes: This table shows the MSE-optimal bandwidth by outcome for the full sample using applicants from 2010-11 to 2014-15.
Source: Author's calculations and NYC DOE data.

Figure A1. District GT Offer and Enrollment by Subgroup, 10-11 to 18-19

A. Offer



B. Enrollment



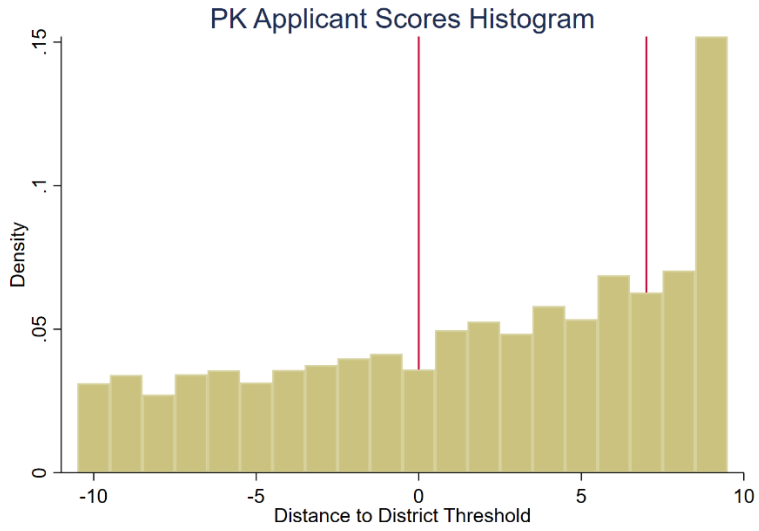
Notes: This figure shows average District GT offer and enrollment outcomes for bins of width 1 on either side of the threshold for all students within the bandwidth of 10 around the eligibility threshold. A linear fit line is on both sides of the threshold.
Source: Author's calculations and NYC DOE data.

Table A3. District GT Offer and Enrollment by Subgroup, PK Applicants, 10-11 to 18-19

	1	2	3	4	5	6	7	8	9
	All	Not NYC	NYC	Not Pov.	Pov.	White	Asian	Black	Hisp
LATE	0.485+	0.378+	0.564+	0.580+	0.624+	0.586+	0.660+	0.553+	0.545+
	(0.019)	(0.026)	(0.016)	(0.020)	(0.025)	(0.030)	(0.027)	(0.032)	(0.037)
RF	0.209+	0.150+	0.259+	0.244+	0.348+	0.220+	0.307+	0.372+	0.254+
	(0.015)	(0.017)	(0.017)	(0.017)	(0.026)	(0.023)	(0.028)	(0.028)	(0.025)
1st	0.432+	0.398+	0.459+	0.421+	0.558+	0.375+	0.466+	0.674+	0.466+
	(0.024)	(0.030)	(0.024)	(0.025)	(0.031)	(0.029)	(0.036)	(0.029)	(0.033)
N	53373	26895	26478	17879	5775	8606	7689	2613	3430

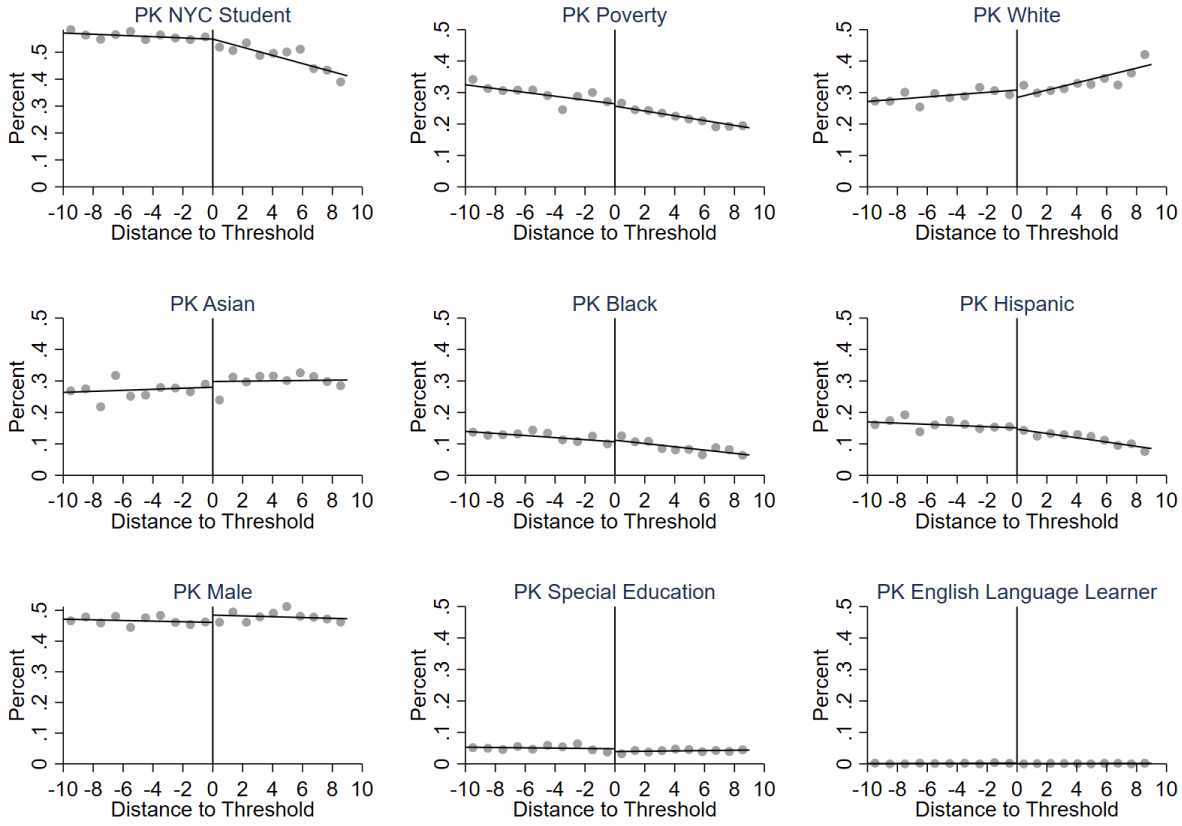
*Notes: The coefficient labeled "RF" is the reduced form estimate from an indicator for scoring above the District GT qualification threshold on District GT enrollment. The coefficient labeled "Offer" is a 2SLS indicator for receiving a District GT offer on District GT enrollment. Each coefficient labeled "First" is a first stage estimate for scoring above the threshold and receiving an offer. All regressions include year fixed effects. Each coefficient is generated by local linear regression with a triangular kernel of bandwidth 10. The sample includes applicants from 10-11 to 18-19. Robust standard errors clustered by baseline district by year are in parentheses. + p<0.01, ~ p<0.05, * p<0.1*
Source: Author's calculations and NYC DOE data.

Figure A3. District GT Histogram Density of Running Variable, PK Applicants, 10-11 to 18-19



Notes: This figure shows the histogram density of the running variable. X line at 0 is the District GT eligibility threshold. X line at 7 is the Citywide GT eligibility threshold.
Source: Author's calculations and NYC DOE data.

Figure A4. District GT Baseline Covariate Distribution, PK Applicants, 10-11 to 18-19



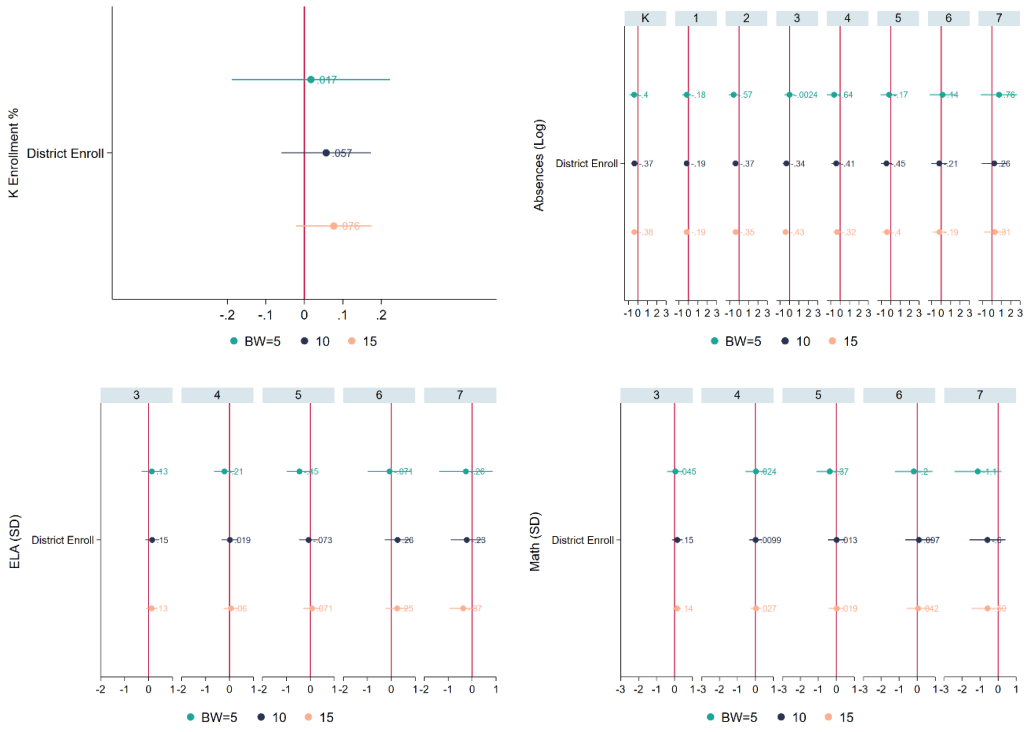
Notes: This figure shows average demographic outcomes for bins of width 1 on either side of the threshold for all students within the bandwidth of 10 around the eligibility threshold. The NYC student graph includes all applicants while the other demographic characteristic graphs are subset to include only NYC-enrolled students. A linear fit line is on both sides of the threshold.
Source: Author's calculations and NYC DOE data.

Table A4. District GT RD Results W/ Covariates, Students in Poverty, PK Applicants, 10-11 to 14-15

	1	2	3	4
	K Enrollment	K Absences (Log+1)	3rd Grade ELA (SD)	3rd Grade Math (SD
LATE	0.019	-0.276*	0.089	0.067
	(0.060)	(0.158)	(0.140)	(0.134)
RF	0.006	-0.138*	0.044	0.033
	(0.020)	(0.077)	(0.070)	(0.066)
N	5774	2642	2287	2285

*Notes: The coefficient labeled "RF" is a reduced form estimate of being above the District GT threshold on the outcome. The coefficient labeled "LATE" is a 2SLS indicator for District GT enrollment on the outcome. All regressions include student covariates and fixed effects. Each coefficient is generated by local linear regression with a triangular kernel of bandwidth 10. The enrollment sample includes applicants from 10-11 to 18-19 while the sample for other outcomes includes applicants from 10-11 to 14-15. Robust standard errors clustered by baseline district by year are in parentheses. + p<0.01, ~ p<0.05, * p<0.1*
Source: Author's calculations and NYC DOE data.

Figure A5. District GT RD Alternative Bandwidths, Students in Poverty, PK Applicants, 10-11 to 14-15



Notes: This shows the RD LATE estimates for each outcome with bandwidths of 5,10, and 15. All regressions include year fixed effects. Each coefficient is generated by local linear regression with a triangular kernel of bandwidth 10. The enrollment sample includes applicants from 10-11 to 18-19 while the sample for other outcomes includes applicants from 10-11 to 14-15. Robust standard errors clustered by baseline district by year are in parentheses.
Source: Author's calculations and NYC DOE data.

Table A5. District GT Lottery Estimates Alternative Specifications, Students in Poverty, PK Applicants, 10-11 to 14-15

	1	2	3	4	5
K Enrollment	0.002	0.020	0.020	0.047	0.179+
	(0.060)	(0.056)	(0.056)	(0.049)	(0.037)
N	559	559	559	559	1152
K Absences (Log+1)	-0.020	-0.173	-0.173	-0.142	-0.144
	(0.321)	(0.325)	(0.325)	(0.302)	(0.109)
N	472	472	472	473	1001
3rd Grade ELA (SD)	0.272	0.235	0.235	0.244	0.168~
	(0.261)	(0.232)	(0.232)	(0.212)	(0.075)
N	385	385	385	386	858
3rd Grade Math (SD)	-0.020	0.084	0.084	0.060	0.091
	(0.238)	(0.217)	(0.217)	(0.206)	(0.070)
N	385	385	385	386	854
Applicant Score	Y	Y	Y	Y	Y
Zoned District	Y	Y	Y	N	N
NYC Enrollment	Y	Y	N	N	N
Student Demographics	Y	N	N	N	N
Choice Set	Y	Y	Y	Y	N

*Notes: The coefficients included are for the "LATE", a 2SLS indicator, for District GT offer or enrollment on the outcome. All regressions include student covariates and fixed effects as noted in table. The sample includes applicants from 10-11 to 14-15. Robust standard errors clustered by baseline district by year are in parentheses. + p<0.01, ~ p<0.05, * p<0.1*
Source: Author's calculations and NYC DOE data.