ECONOMIC OUTCOMES AND THE DECISION TO VOTE:
THE EFFECT OF RANDOMIZED SCHOOL ADMISSIONS
ON VOTER PARTICIPATION

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ABSTRACT

There is little causal evidence on the effect of economic and policy outcomes on voting behavior.
This paper uses randomized outcomes from a school choice lottery to examine if lottery outcomes
affect voting behavior in a school board election. We show that losing the lottery has no significant
impact on overall voting behavior; however, among white families, those with above median income
and prior voting history, lottery losers were significantly more likely to vote than lottery winners.
Using propensity score methods, we compare the voting of lottery participants to similar families
who did not participate in the lottery. We find that losing the school choice lottery caused an
increase in voter turnout among whites, while winning the lottery had no effect relative to
non-participants. Overall, our empirical results lend support to models of expressive and
retrospective voting, where likely voters are motivated to vote by past negative policy outcomes.

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1 Introduction

What motivates citizens to vote? Understanding the factors that influence voting behavior is a central issue in political economy and public finance. Political platforms, campaign tactics, and public policy are all affected by voter behavior. Furthermore, the funding of critical public goods such as public education is often directly determined by ballot box outcomes. Consequently, the way in which economic outcomes influence voter turnout and voting behavior has important implications for understanding electoral politics, the provision of public goods, and equilibrium welfare in a democratic system.

Because the marginal impact of any one individual's voting decision is likely to be much smaller than the cost of participating (Downs (1957), Olson (1965), Palfrey and Rosenthal (1985), and Feddersen (2004)), researchers have turned to empirical estimation to examine the determinants of voting. There is a significant literature using observational data to link economic and policy outcomes with voting behavior (Kramer (1971), Bloom and Price (1975), and Kinder and Kiewiet (1979)). Many of these papers use macroeconomic outcomes and national election results to test models of retrospective voting; where voters punish or reward incumbents for past performance. Because economic indicators are correlated with other factors that may affect elections, a more recent line of research has focused on randomized field experiments to identify the factors that affect voting behavior. For example, Gerber and Green (2000) randomized get-out-the-vote efforts such as door-to-door canvassing, to test if appeals to civic duty, the closeness of the election, or neighborhood solidarity cause people to vote. They find convincing evidence that canvassing efforts significantly increase voter turnout. While these experiments carry the force of causal identification, they cannot test how policy or economic outcomes impact voter decisions.

In this paper, we present new evidence on voter turnout using a unique policy experiment that randomized economic outcomes across potential voters. We use school district administrative data and voter registration data for families in Mecklenburg County, North Carolina (which includes the city of Charlotte, North Carolina). In 2002, the Charlotte-Mecklenburg school district (CMS) implemented a district-wide school choice plan after its race-based bussing plan was terminated by the courts. Under the

choice plan, parents in the district submitted their top three choices of schools for their children, and the district assigned students to schools through a lottery system. We match administrative data on students' choices, lottery numbers, demographics, and school assignments to voter records from the Mecklenburg County Board of Elections for the school board election immediately following the implementation of the school choice plan. We test if losing or winning the lottery to attend one's first-choice school affected the decision to vote. Since lottery outcomes were randomly assigned, they are orthogonal to other factors that may influence voting behavior, such as past voting behavior, income, or a person's political views.

We find that, on average, school admissions decisions had no significant impact on the decision to vote. However, among white families, those with the highest voter participation rates, lottery losers were significantly more likely to vote in the ensuing school board election than lottery winners. The effect among whites is large in magnitude: losing the lottery increases the odds of voting by 38.7% relative to winning. This corresponds to a 7 percentage point increase in voter turnout. We then test if this differential effect of losing the lottery relative to winning the lottery is consistent with an increase in voter turnout for lottery losers or a decrease in turnout for lottery winners. In order to do so, we identify a group of students who were not lottery participants and were the least affected by the introduction of the school choice plan. The voting behavior of these "status-quo" families serves as a measure of voting behavior in the absence of positive or negative school choice lottery outcomes. We use propensity score estimates to re-weight the sample of status-quo students, balancing the distribution of baseline characteristics across the status-quo and lottery groups. Regression results indicate that losing the school choice lottery led to an increase in voter turnout among white families relative to those unaffected by the lottery, while winning the lottery had no effect on voting behavior.

Our findings are broadly consistent with randomized field trials of get-out-the-vote efforts, which have found effects of similar magnitude from door-to-door canvassing efforts. As in our results, that work suggest larger effects among regular voters in municipal elections (Green and Gerber, 2004). Overall, our empirical results lend support to models of expressive and retrospective voting, where likely voters are motivated to

vote by past negative policy outcomes (Bloom and Price, 1975). They may do so because of the gain in utility from expressing frustration (a form of expressive voting) or to punish incumbent for past negative outcomes (a form of retrospective voting where punishment of the incumbent motivates turnout more than reward does). The results are also consistent with Hirshman's (1970) idea of <u>Exit, Voice, and Loyalty</u> in consumer responses to firm behavior. When faced with a monopolist provider of a product without close substitutes, such as a public school district, consumers may voice frustration with the product, here at district officials through school board elections, since they cannot easily exit by switching to an alternative supplier.

This paper proceeds in four sections. The first section reviews the relevant literature. The second section describes the details of the CMS choice plan and lottery, which is followed by a discussion of the school board election and the voter registration data. The fourth section describes the data and presents the results. The final section concludes.

2   Literature Review

The expected impact of any individual's vote on an election outcome is likely to be much smaller than the cost of participating (Downs (1957), Olson (1965), Palfrey and Rosenthal (1985), and Feddersen (2004)), creating difficulty in motivating voting as the result of a personal cost-benefit trade-off. This paradox of not voting had led to a growing empirical literature examining other factors that influence voting behavior. George and Waldfogel (2002), Gentzkow (2006), and DellaVigna and Kaplan (2006) study the effects of media exposure on voter turnout. George and Waldfogel (2002) find that an increase in the circulation of the *New York Times* is correlated with a decline in the readership of local newspapers as well as the probability of voting in local elections by college-educated individuals relative to others. Similarly, Gentzkow (2006) finds that the introduction of television led to declines in newspaper readership, radio listening, political awareness, and voter turnout, with the largest effects in local elections. Finally, DellaVigna and Kaplan (2006) find a positive effect on voter turnout in towns where the Fox News Channel had entered by the time of the election.

A second line of research has focused on field experiments to investigate reasons for voter turnout. Gerber and Green (2000) use field experiments with random assignment of get-out-the-vote canvassing to examine what motivates voting. They find that door-to-door canvassing has a significant impact on voter turnout and is much more effective than alternative get-out-the-vote methods such as phone calls. In addition, the authors vary the canvassing treatment to test different voting motivations, randomly appealing to i) a sense of civic duty, ii) an importance for welfare of local community (community solidarity), and iii) a statement of a 'close election' aimed at affecting the subject's perception of the probability of swinging the election. They find the strength of estimated impact on voter turnout was 9.1, 5.1, and 12.1 percentage points, respectively, lending suggestive evidence that an increased chance of being pivotal has the strongest impact on voting behavior, although the estimates are not statistically significantly different. Green and Gerber (2004) provide a summary of empirical evidence from voter mobilization field experiments.

There is little evidence on the effect of economic and policy outcomes on voter behavior, in part because it is difficult to identify exogenous sources of variation in these outcomes. Green (2005) studies the impact of PROGRESA, a government transfer program in Mexico aimed at poor rural neighborhoods, on community-level voting behavior. In order to identify the effect, she exploits discontinuities in a community's propensity to be enrolled in PROGRESA. Green does not find evidence that PROGRESA significantly affected community voter turnout or the fraction of votes for the incumbent.

There is a recent literature using school choice lotteries and randomized voucher experiments to identify the impact of school choice on student outcomes (Hastings, Kane, and Staiger (2006a,c), Cullen, Jacob, and Levitt (2003), Mayer, et al. (2002), Krueger and Zhu (2004), and Rouse (1998)). Instead of focusing on student outcomes, our paper uses randomized school admissions generated by a school choice lottery to estimate how being given access to a better school influences parents' decision to vote. As far as we know, this is the first analysis of the causal effect of randomly assigned economic outcomes on subsequent voting behavior. The link between school choice and voter behavior is of direct interest, in that it determines implicit incentives for politicians that may prevent

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efficient adoption of school choice programs. A few papers have found that higher income homeowners with access to better schools oppose school voucher ballot initiatives (Brunner, Sonstelie, and Thayer (2001) and Brunner and Sonstelie (2003)), but none of these studies involved random assignment or were able to evaluate whether the actual impact of the policy influenced voting behavior.

3   The CMS School Choice Plan

3.1   School Choices

For three decades the Charlotte-Mecklenburg public school district (CMS) bused students to assigned schools to achieve racial integration. In September 2001, the U.S. Fourth Circuit Court of Appeals declared the school district "unitary" and ordered the district to dismantle the race-based student assignment plan by the beginning of the next school year. As a consequence the school district moved to implement a new district-wide public school choice plan to replace the bussing system beginning in the 2002-2003 school year.

In the spring of 2002, parents were asked to submit their top three choices of school programs for each child. Each student was assigned a "home school" in her neighborhood, typically her closest school, and was guaranteed admission to this school if she was not admitted to any of her top three choices. Students were similarly guaranteed admission to continue in magnet programs in which they were enrolled in Spring 2002. Admission to non-guaranteed schools was determined by a lottery system described further in the next section. After the first year of the choice plan, parents with children in rising grades, parents entering CMS, and any parents who wished to change their child's school were required to submit choice forms in a similar manner. Again admission to oversubscribed schools was assigned by lottery. Students who were in non-rising grades and had already sorted into one of their preferred schools in the first year of school choice did not have to submit a choice form if they wished to stay where they

were. In each year, CMS had near perfect compliance; approximately 95% of parents who were required to submit a choice form did so.

The implementation of the school choice program resulted in a large redistricting of home school assignments. Prior to choice, school assignment zones were drawn to capture non-contiguous black and white neighborhoods to achieve racial balance. With the introduction of the choice plan, families were assigned to a default school in their neighborhood. As a result, approximately 50 percent of parcels lost property rights to the school they were assigned to under the bussing plan. The introduction of the school choice plan was intended to provide more educational options to parents. The initial school choice plan was to stay in effect for 3 years (through 2005-2006 school year), at which time there would be an extensive review of the choice system allowing for public comment and discussion.

We were given secure access to administrative data including the choice response forms for the first two years of school choice. For each school year, the school choice response forms were submitted in the spring of the prior school year. For example, choices for the 2002-2003 school year were submitted in Spring 2002, and choices for the 2003-2004 school year were submitted in Spring 2003. For each of these school lotteries, we have the choice response forms and demographic information including geographic location for approximately 95% of the students who were required to submit choice forms.[1]

3.2   Lottery Assignments

In the first school choice lottery, every student was required to submit a choice form to CMS. As described earlier, each student was assigned a new neighborhood school, at which they were given a guaranteed seat. If a student chose this new 'home school' as her first choice, she was guaranteed admission. Many students did not list their home school for any of their three choices.[2] Our analysis will focus on students who did

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[1] The remaining 5% of students did not submit choice forms even though they were required to. CMS officials then assigned them to their guaranteed neighborhood school.

[2] Please see Hastings, Kane, and Staiger (2006b) for a detailed description of the choices and how they varied in the student population.

not choose their guaranteed home school, whose admission to their first-choice school was determined by lottery number.

In the second year school choice lottery, only students who were in rising grades, new to CMS, or affected by changes in home school boundaries resulting from the opening of new schools were required to submit choice forms. If a non-rising grade student wished to continue at her current school (the school she was admitted to after the first year of school choice assignments), she was not required to submit a choice form. Hence from the second year of lottery assignments, we will again only use those students who chose a non-guaranteed school as their first choice, and hence had an admission status determined by the school choice lottery. Across the two years of lottery choices, slightly over half of the students submitting choice forms chose their guaranteed school, and the remaining students chose a school for which they were not guaranteed admission.

Admission of students to non-home choices was limited by grade-specific capacities set by the district. In the first year of school choice, the district allowed significant increases in enrollment at high-demand schools in an effort to give each child one of her top three choices. As a result, approximately 95% of students in the first year of choice received admission to one of their top three choices. School capacities were not expanded in the second year of school choice; however, parents were not informed of this policy change prior to submitting choices.

Approximately one third of the schools in the district were oversubscribed in the first year, and approximately two thirds of schools were oversubscribed in the second year. The district implemented a lottery system for determining enrollments in those oversubscribed schools. Under the lottery system, students choosing non-home schools were first assigned to priority groups and student admission was then determined by a lottery number. The priority groups for district schools were arranged in the following lexicographic order:

Priority 1: Student who had attended the school in the prior year. (Students were subdivided into 3 priority groups depending upon their grade level, with students in terminal grades—grades 5, 8 and 12—given highest priority.)

Priority 2:   Free- or reduced-lunch eligible student applying to school where less than half the students were free- or reduced-lunch eligible.

Priority 3:   Student applying to a school within her geographic Choice Zone.[3]

Under the lottery system, students listing a given school as their first choice were sorted by priority group and a randomly assigned lottery number.[4] Slots remaining after home school students' first choices were accounted for were assigned in order of priority group and random number.[5] If a school was not filled by those who had listed it as a first choice, the lottery would repeat the process with those listing the school as a second choice, using the same priority groups as above.

Students who were not assigned one of their top choices were placed on a waiting list. About 19% of students winning the lottery to attend their first-choice schools subsequently attended a different school, with 13% choosing to attend their home school instead and another 6% choosing to attend a different school entirely, with most of these students changing address. When slots became available, students were taken off the wait list based on their lottery number alone, without regard for their priority group.

This system of assigning students to schools effectively splits parents into two groups. If parents selected their home school as their first choice, they knew they were guaranteed admission. If parents selected a non-guaranteed school, they knew that admission would be assigned by lottery if the school were over subscribed. This second group learned whether they were admitted or not to their first-choice school at the end of the school assignment period, but did not learn the reason for being admitted (e.g., because of a high priority, because of a high lottery number, or because the school was not over-subscribed). Thus, from the parents' perspective, being admitted to any non-

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[3] The county was split into four geographic Choice Zones. A student could choose any school in any Choice Zone; however, bussing would only be provided by the district to schools within the student's Choice Zone.

[4] The random number was assigned by a computer using an algorithm that we verified with CMS computer programmers. Parents do not know their lottery numbers. They submit their choice forms to CMS, who assigns a random number to each submission and then communicates outcomes to parents once the lottery assignment algorithm is run.

[5] Once any sibling was admitted to a school, other siblings could choose to attend the school. In other words, if two siblings list the same school as their first choice, their lottery number is effectively set to the minimum of their individual lottery numbers. We dropped those who were admitted to a school because of a sibling preference.

guaranteed school was the result of winning a lottery – even though lottery numbers played no role in determining admission for many priorty groups.

4   The Election and Voter Registration Data

4.1   The November 2003 School Board Election

On November 4, 2003, Mecklenburg County voters went to the polls to vote in elections for local officials including the three at-large school board members.[6] The CMS school board is composed of nine members: three at-large members and one member for each of six sub-districts. All board members are elected to four-year terms with at-large members and district members elected in an alternating cycle every two years. The school board decides on goals and policies for CMS including funding initiatives and bond measures, new school sites, and funding allocation. The school board also appoints the Superintendent, who runs the daily operation of the school district and implements the board's policy.

Of the three at-large board members up for re-election, two did not seek re-election. The one member who did seek re-election was also the sitting chair of the school board. Table I shows the names and occupations, and describes the platforms of the candidates for the three at-large seats, as well as the total votes cast for each candidate. The three candidates with the most votes are elected as at-large members, and typically serve as the school board chair and vice chairs.[7]

Two items in Table I are important to note. First, the sitting chair was not re-elected, losing by a small margin. Second, based on the official platforms of the candidates, changing the school choice system was not one of the foremost campaign issues. Instead, the winning candidates focused on traditional issues such as budget streamlining and funding increases, improving quality and retention of teachers, and

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[6] Other offices up for election included mayor and city council.

[7] Source: Charlotte Advocates for Education voting guide. The Chair and Vice-Chair serve one-year terms and are not necessarily at-large members.

improving student achievement in general.[8] One reason for this may have been that the old regime of bussing for integration was outlawed by the courts, and the district had made a three-year commitment to the school choice plan before conducting a review process and discussing potential changes. In addition, since most residents received their first-choice school in the first year of choice, many constituents may have been satisfied with the choice system, and more concerned with other issues such as funding, growth, and education improvement.

4.2   Mecklenburg County Voter Registration Data

The November 2003 elections followed directly after the first school year under school choice, and after the first two school choice lotteries and assignments had been made. Figure 1 presents a timeline of events. The Mecklenburg County Board of Elections keeps voter registration data with demographic information and past voting history for up to 20 elections for every registered voter in Mecklenburg County. The data are updated continuously as new voters register and as current voters change addresses within county. We were able to obtain an older version of the voter registration file that was inadvertently preserved from March 2004. This data set includes the full name, address, ethnicity, gender, party affiliation, date of last address change, and voting history for every registered voter in Mecklenburg County as of March 2004. The addresses from this file were geocoded by the Board of Elections, giving us precise longitude and latitude coordinates for each registered resident. Since most moving occurs during the spring-fall months, the March 2004 geocoded data provide fairly accurate information on voters and their locations in November 2003 at the time of the election.

Table II describes the demographics of registered voters and those who cast ballots in the November 2003 election. Based on demographic information for the county

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[8] The one candidate to mention issues related to the school choice plan was Mr. Mike Kasper who stated one primary objective was to establish 'Neighborhood Schools Zones' that are permanent. This platform was directed at the high-growth and wealthy southern districts within CMS who had experienced several home school boundary changes with the opening of new schools over the past 10 years: both before and after the school choice plan was implemented. Some parents in those communities wanted to have more stability in their designated neighborhood school as new schools were opened. This area is largely affluent and white – the group of citizens who are traditionally most likely to vote.

as a whole, whites are more likely to be registered and are more likely to have voted if they are registered. Moreover, registered voters have on average significantly higher incomes than the county-wide population average, where income is measured by the median household income for residents of the voter's own race living in the voter's own block group as reported by the 2000 Decennial Census. Of registered voters, those actually casting ballots in the 2003 election were again wealthier than the average registered voter. In addition, voters registered as Independent or Libertarian (not Republican or Democrat) were less likely to cast ballots in the election than those who were registered as Republican or Democrat.

5 Estimating the Impact of Lottery Outcomes on the Decision to Vote

5.1 Defining the Randomized Sample of Lottery Participants

We use the school lottery outcomes to create treatment and control groups. We focus on the subset of students choosing schools that were over-subscribed. We then limit our sample to students in randomized groups, that is, those priority groups for which admissions to the first-choice schools were determined solely on the basis of a random number. Recall from Section 3.2 that admissions to oversubscribed schools were determined by the concatenation of a priority number, which depended on student and school specific factors such as free- and reduced-lunch status, and a randomly generated lottery number. We ignore members of priority groups in which all students were either admitted or denied admission—since the assignment of lottery numbers had no impact on their admission status. Hence, for all students in the analysis, the randomly generated lottery number solely determined admission to the first-choice school within each school choice and grade combination. In some schools, the randomized group will consist of students who attended the school the year before, or free- or reduced-lunch eligible students, or students from the Choice Zone. The randomized group may also be different for different grade levels in a school.

We began with the choice forms submitted by 105,706 students in the first year, and 33,530 students in the second year. After dropping students who had special

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disabilities needs and students who were admitted because of siblings, we were left with a sample 92,789 in the first year and 29,104 in the second year of data. Of these, approximately 60% in the first year and 51% in the second year listed their guaranteed school as their first choice and were therefore not subject to randomization. We then further excluded students within priority groups that were sufficiently high or low so that all members of the priority group were admitted or excluded from admission to their first-choice school and grade combination. This left us with 10,174 students in randomized groups: 6,931 students from the first lottery year and 3,243 students from the second lottery year.

Of the 10,174 students in randomized groups, we excluded 62 students (124 observations) who were in randomized groups for both lottery years but won one lottery and lost the other. We further excluded 98 students who were graduating seniors in the 2002-2003 school year since they were not enrolled in CMS in the following year (after graduation) making it impossible to link them to voter registration files based on home address in fall of 2003. In addition, following Hastings, Kane, and Staiger (2006a,c), we further exclude 351 inactive students in the randomized groups. Inactive students are students who reside in Mecklenburg County but do not receive schooling through CMS at the time they submit their school choice application. These include current private school or home school students who participate in the lottery in order to potentially gain admission to a public school they would prefer to their current alternative. We drop the inactive students because (like the seniors) they were unlikely to be enrolled in CMS and provide a home address in the fall of 2003, particularly if they lost the lottery to attend their first-choice school. Finally, we drop an additional 193 students with missing baseline information.

Table III shows the characteristics of the remaining 9,408 students in randomized groups versus the characteristics of all students in CMS. Students in randomized groups are slightly more likely to be African American and slightly more likely to be recipients of federal lunch subsidies. In addition, they come from guaranteed school assignment zones with significantly lower than average test score outcomes. However, they chose schools with higher than average standardized test score results. School test scores are calculated as the average of the student-level standardized test scores for students

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attending each school program. The student-level test scores are standardized by the district-wide mean and variance within each grade.

5.2 Matching Student Data to Voter Registration Data

Within the randomized groups, we would like to estimate the impact of winning the lottery to attend a first-choice school on the decision to vote. Therefore, we must first match the voter registration data to the lottery outcome data. We have geocoded locations for students and voters, as well as street address and full name for students and street addresses and full names for registered voters from the voter data. We use the student locations provided to us in the Fall 2003 student census, which the district uses to create the official enrollment lists for federal and state funding. The census is taken on the 20th day of the school year - approximately at the end of September 2003. This gives us address information as close as possible to the actual election date. We use these geocoded residential locations to create matches between students and registered voters in the voting file.

Student locations were geocoded by the district at the center of the housing parcel, while the voter registration data were geocoded to the middle of the street in front of the residence. Hence the geocodes did not perfectly overlap across the two data files. In order to match voters to students, we created small geographic circles around each student, and pulled off all voters that fell within that geographic radius. Within each geographic radius, we then matched voters to students by matching on exact street address and exact last name. This resulted in approximately 90% of our overall matches. We then examined the remaining students, creating matches for those with hyphenated last names and those with slight name misspellings (e.g. McDowell vs. MacDowell), still requiring a match on geography and street address. Those students with no match are then counted as having no registered voters in their household.

5.3 Attrition

Lottery outcomes are from the spring of 2002 and 2003, while voter data is based on residential location in the fall of 2003. Some students in randomized groups have left CMS by the fall of 2003, and for these students the voter data is missing leading to potential attrition bias. Of the 9,408 students in randomized groups, 8,085 remained enrolled in CMS by the fall of 2003 for an average attrition rate of just over 14%.[9] Table IV presents results comparing attrition across lottery winners and lottery losers from a regression of an indicator of whether a student was not present in CMS in the fall of 2003 on an indicator of whether she won the lottery, controlling for baseline characteristics and school choice and grade (lottery-block) fixed effects.[10] Among all students, lottery winners were less likely to attrit than lottery losers. This differential attrition was quite small in magnitude and insignificant in either lottery year individually but was significant in the pooled randomized sample. Columns 2 and 3 present the differential attrition rates for lottery losers versus lottery winners by race. The differential attrition is higher for whites than for non-whites and significant for whites in the pooled sample as well as among 2002-2003 lottery participants. For non-whites, differential attrition is near zero and insignificant for all lottery groups. Overall, the low rates of attrition in this sample minimize the possibility that the initial randomization is biased by systematically missing data from attriters. To the extent that lottery losers who leave CMS may have been particularly angry (and therefore most likely to vote), their somewhat higher rates of attrition would act, if anything, to understate voter turnout among those losing the lottery, particularly among white families – thus working against our results.

In order to further verify the validity of the initial randomization in our final analysis sample, we compare the baseline characteristics of lottery winners and losers among the 8,085 non-attriting students in the randomized groups. Table V reports mean baseline characteristics for lottery winners and losers, as well as regression adjusted differences from an OLS regression of each baseline characteristic on an indicator of whether the student won the lottery as well as fixed effects for the school program and

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[9] This attrition is reasonably consistent with estimates of inter-county mobility rates from the Census. Approximately 6% of school age children living in the South moved to a different county between March 2002 and March 2003. Mobility rates tend to be somewhat higher in urban, high-poverty populations (Schachter, 2004).

[10] Note that lottery-block fixed effects span priority group fixed effects. We must control for lottery-block fixed effects since the odds of admission change across each lottery.

grade for which the lottery is being conducted. Before adjusting for lottery block fixed effects, there are a few differences in baseline characteristics between lottery winners and losers. However, these differences were largely due to a correlation between the characteristics of lottery participants and the lottery odds. After including a fixed effect for each school program and grade, all such differences were smaller and were generally not significantly different from zero. In particular, the final row of Table V shows that prior voting history is not caused by lottery outcomes. The 2001 election was the most recent school board election prior to 2003. The exogeneity of lottery outcomes to prior voting history is important since prior participation in school board elections is the single strongest predictor of future voting behavior. The only characteristic for which there remained a statistically significant difference after including the lottery block fixed effects was free- and reduced-lunch recipient status. Since admission priorities depended in part on a student's lunch status, there were very few lotteries that had any variation in this variable, making this estimated difference somewhat suspect.[11]

5.4   Regression Results

Table VI reports the estimates of the effects of *losing* the lottery relative to winning the lottery on voter turnout using a conditional logit specification (Chamberlain (1980)) which conditions on choice-grade (lottery-block) fixed effects and student baseline demographic characteristics. Standard errors are clustered at the choice-grade level. The dependent variable is an indicator variable if any person in the student's household voted. For some of the smaller lottery blocks, there is no variation in the dependent variable across students. These observations are dropped from the conditional logit estimation since they add no information to the likelihood function. This reduces the number of observations in this analysis to 7,365.

The results presented in Column 1 of Table VI show that, overall, there was no significant differential impact of losing versus winning the lottery on voter turnout. However, Column 2 shows that among parents of white students, those families that are

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[11] The results in Table V do not change significantly if we use the full sample of 9,408 students (including the attriters) for whom we have student level characteristics (excluding prior voting history).

most likely to vote in any election, there is a strong and significant differential impact of losing the lottery on voter turnout. In particular, among white voters, losing versus winning the lottery increases the odds of voting by approximately 38.7% (exponentiating the logit coefficient). Given a 31% voting rate among white lottery winners, this translates into a 7 percentage point increase in the voting rate. This is a very strong, but not unreasonably strong, impact on voter turnout. For example, the estimated impact is approximately as large as the effect of door-to-door canvassing identified in Gerber and Green (2000) of 8-9 percentage points (relative to an average voting rate of 45% in their sample). In contrast, there is no significant effect of lottery outcomes on voting in the non-white population. Baseline characteristics are included to improve precision of the estimates but do not affect the point estimates of the impact of randomly assigned lottery outcomes on voter turnout. The baseline coefficients validate correlations in the overall voting population: voter turnout is significantly higher among whites, higher-income populations, and among citizens who voted in the prior school board election (November 2001).

Table VII presents alternative specifications for the relationship between lottery outcomes and voting behavior. Columns 1 through 3 present the results from a linear probability model using an indicator if someone from the household voted as the dependent variable, controlling for baseline characteristics and lottery-block fixed effects. The results are similar in sign and magnitude to those presented in the conditional logit specification, with losing the lottery significantly increasing voter participation among white lottery participants by approximately 5 percentage points.

Columns 4 through 9 use the total number of people who voted from a student's household as the dependent variable. This measure may more accurately reflect the change in total voter turnout caused by losing the lottery; however, because the number of adults of voting age present in a household varies with race and income level, it also includes in it a family size or marital status component that we do not directly observe. Nevertheless, results using the vote count as the dependent variable are similar to those based on whether anyone in the household voted, showing significant positive effects of losing the lottery on voting among whites. Columns 4 through 6 use a linear specification while Columns 7 through 9 use a fixed-effect poisson model for count data (which drops

observations in lottery blocks with no voters, yielding a sample of 7,373 observations). Across these two specifications, the estimated change in voter turnout for lottery losers versus lottery winners is roughly the same. For example, Column 5 shows that the number of votes per household increases by .082 among white lottery losers, while Column 8 shows the increase at .091 (17.8% increase on a base of 0.51 total voters per household).

5.5   Do Lottery Losers Vote More or Do Winners Vote Less?

The results from Tables VI and VII document a robust positive effect of losing the lottery relative to winning the lottery on voter turnout among white lottery participants. Furthermore, it is reasonable to generalize these results to lottery participants outside of the randomized groups, since parents who applied to non-guaranteed schools were unaware of being in the randomized groups and only knew their admission outcome. However, by themselves, these lottery results cannot determine whether voter turnout *increases* among lottery losers or *decreases* among lottery winners.

In order to determine if losers vote more or winners vote less (or both), we need a counterfactual estimate of voting behavior for families had they been unaffected by the school choice lottery. Ideally we would like a set of families who had the same incentives to vote as they would have had absent the school choice plan. For example, this could be a set of families who were randomly excluded from the choice plan as long as exclusion did not cause a change in voting behavior. Since the school choice plan was implemented district-wide, and since lottery *participation* was not randomized, we do not have a randomly generated group of excluded families, let alone ones for whom exclusion would have no effect on their voting behavior. We can, however, identify families unaffected by the policy change who may serve as a reasonable counterfactual for the randomized lottery participants. These families are ones who chose their guaranteed school, and for whom their guaranteed schools (at all levels) under the choice plan were the same as their assigned schools under the previous bussing regime. The school choice plan left these families effectively with the same schools that they would have had in the absence of the policy change, and we might expect their voting behavior to be the same under the school

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choice plan and under a counterfactual continued bussing regime. We refer to this group of families as the 'status-quo' group. Comparing lottery winners and losers (in the randomized group) to the status-quo group provides a test of whether losers vote more or winners vote less, relative to what would have occurred in the absence of the choice plan.[12]

In order to construct the status-quo group, we took the following steps. First, using the boundary changes in school assignment zones that were implemented with the school choice plan, we identified families who kept guarantees to all levels of schools for which they had guarantees in the 2001-2002 school year and whose children were assigned to those schools. These families make our 'status-quo' group. There are 7,966 'status-quo' students who had guarantees to and were assigned to the schools and grades chosen by students in our randomized groups.

Table VIII summarizes differences in baseline characteristics for students in the status-quo versus the randomized groups. Columns 1 and 2 present mean characteristics for students in the status-quo and randomized groups, respectively, while Column 3 presents regression adjusted differences in baseline characteristics between the status-quo and randomized groups controlling for school choice and grade level (lottery-block) fixed effects. Students who have guaranteed rights to attend the chosen schools are significantly more likely to be white, less likely to receive federal lunch subsidies, and have on average higher neighborhood income levels. Their parents also are much more likely to have participated in the prior school board election. Thus there is substantial non-overlap in the baseline characteristics that determine voting between the status-quo and randomized groups.

We use a propensity score approach to better match the baseline characteristics of the status-quo group to the randomized groups (Hirano, Imbens, and Ridder (2003), Barsky et al. (2002), Imbens (2003)). Let the propensity score (P) be the probability that a student is in the randomized groups (as opposed to the status-quo group) within each

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[12] We treat the status-quo families as having neither won nor lost since they did not participate in a gamble, and their decision not to participate was mostly caused by predetermined residential location and the geographic redistricting that occurred with the choice plan. One may instead argue that these parents considered themselves winners just like lottery participants who won admission to a non-guaranteed school. In this case, they would not serve as a valid counterfactual for voting behavior in the absence of winning or losing the school choice lottery.

chosen school as a function of baseline characteristics. We re-weight observations in the status-quo sample by P/(1-P), which balances their distribution of baseline characteristics with the randomized group within each chosen school. To construct the propensity score, we estimate a separate probit for each chosen school, controlling for free- and reduced-lunch status, white, female, median income, median income squared, and an indicator if someone from the household voted in the 2001 election.[13] We dropped students in schools for which the number of students in either the randomized or status-quo group was less than 10 or in schools in which being in the randomized group was perfectly predicted by observable characteristics. This dropped 553 students from the randomized groups and 1,510 students from the potential pool of status-quo students. Baseline conditional logit estimates of the effect of losing the lottery on voter turnout were similar after dropping these students.

The final column of Table VIII presents the regression adjusted difference in baseline characteristics between the randomized groups and the status-quo group, using the propensity score to re-weight the status-quo group. In contrast to the un-weighted difference in the previous column, there is no significant difference in baseline characteristics between the randomized and status-quo groups in the re-weighted sample. Thus, re-weighting based on the propensity score yields a (weighted) status-quo sample that is much better matched to the randomized sample in terms of observable characteristics. Using these weights, we can estimate the average treatment effect of losing the lottery and winning the lottery on voter turnout relative to a comparable status-quo group.

Table IX presents weighted estimates of the effect of losing the lottery or being in the status-quo group on voting behavior, relative to winning the lottery. Because our weights vary within lottery-block (the fixed-effect level), we cannot use the conditional logit specification, so we focus on the linear probability model instead. The excluded group is lottery winners. Columns 1 through 6 present results using the same specification as those in Table VII, Columns 1 through 6, adding the status-quo group of

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[13] Note that estimating separately for the sample of students choosing each school adds considerable flexibility to the probit, and saturates the propensity score model without saturating the model of interest. Estimating the propensity score using one probit for the entire sample of students (thus excluding the interactions with school chosen) and controlling for lottery-block fixed effects did not sufficiently balance baseline characteristics between the status quo and randomized groups within lottery block.

students and estimating by weighted least squares (with the status-quo group weighted as discussed above). As before, the coefficient on losing the lottery is positive and significant for whites in both Columns 2 and 5. However, across all columns, the voting behavior of the status-quo group is statistically the same as that of the lottery winners. These estimates suggest that losing the lottery causes an increase in voter turnout among white families, while winning the lottery causes no change in turnout relative to status-quo voting behavior.

5.6   Alternative Specifications

Our empirical evidence suggests that losing the school choice lottery leads to increased voter turnout amongst white families. However, income and prior voting history are both highly correlated with race. Evidence on voter response to randomized get-out-the-vote campaigns suggests that prior voters are the most likely to respond to canvassing efforts in municipal and local elections (Green and Gerber (2004), p. 37).

Table X presents estimates from specifications that include interactions between losing the lottery and each of these baseline characteristics. As in Tables VI and VII, these specifications are estimated using only the students in the randomized group. Column 1 shows that the effect of losing the lottery on voter turnout is increasing in income and that the interaction with race becomes insignificant once this interaction is included. Income is measured as the median income for households in student i's block group of student i's race demeaned by the county-wide median income of $51,000 and divided by 1,000. Hence, these coefficients imply that losing the lottery has no impact on voting at incomes of around $40,000 but increases the odds of voting by over 50% at incomes in the $100,000-$150,000 range. Column 2 adds an interaction between prior voting history and lottery outcomes. The coefficient on the interaction between voting history and losing the lottery is positive and significant indicating that, among probable voters (with median income), losing the lottery increased the odds of voting by 41% (an 8 percentage point increase off of a base of 67% for probable voters who won the lottery). The coefficient on income interacted with lottery outcomes remains unchanged. Hence, the asymmetric effect of losing the lottery on voter turnout is more likely a function of income and past voting history than it is of race.

The final two columns of Table X allow the effect of losing the lottery on voter turnout to be a function of the difference in the quality of the child's first-choice school and the child's neighborhood school, where quality is measured by the average standardized test score for students in the school. The majority of students who did not win admission to their first-choice school were admitted to their neighborhood school, and one might expect a larger impact on voting if students were denied access to a school with much higher test scores than their neighborhood school. Column 3 of Table X shows an insignificant coefficient on the interaction between losing the lottery and the score gap between the first-choice and home school. Column 4 of Table X breaks the interaction between losing the lottery and the score gap into two terms to further test if those who experienced losses in academics were more likely to vote. The first term is the difference between the first-choice school score and the last year's school score if the family received admission to their first-choice school (the academic gain), while the second term is the difference between the home school score and the last-year's school score in the event that the family lost the lottery (the academic loss). This alternative specification of the relative importance of improving education for lottery losers and lottery winners does not yield significant results either. Hence, the impact of losing the lottery on voting does not appear to be a function of the difference in the test scores between the child's first-choice school and the child's neighborhood school.

5.7   Precinct-Level Outcomes

If the current results are generated by the desire to voice frustration or retrospectively punish incumbents for negative policy outcomes, we might expect lottery losers to turn out against the incumbent school board chair. Unfortunately, with individual-level data, we cannot say anything about *how* people voted, only whether or not they voted. Nevertheless, we can examine the cross-sectional relationship between the precinct fraction of votes against the incumbent and the fraction of families who were negatively impacted by losing the school choice lottery.

Our approach is as follows. Mecklenburg County had 190 precincts at the time of the 2003 election. We first use geocoded student locations and precinct boundary files to

determine the precinct that each family lived in. Using the school assignment outcomes, we categorize students as losing the lottery if they did not gain admission to their first-choice school. Thus, we assume that voting behavior among all families that lost the lottery was similar to what we estimated using the randomized groups. Our results in Table VI imply that the voting behavior of white families changed as a result of losing the lottery. Therefore, we generate the fraction of students in each precinct who were white and who were denied admission to their first choice school, as well as precinct-level averages of student characteristics that might affect election results. Table XI presents results for regressions in which the dependent variable is the precinct-level fraction of voters who did not vote for the incumbent (i.e., (#voters - #votes for incumbent)/#voters). The key independent variable is the fraction of students living in the precinct who were white and had lost the lottery. While this approach does not carry the force of randomized assignment, it is helpful to see if election results by precinct are consistent with our prediction that losing the school choice lottery moved the election results against the incumbent.

Columns 1 through 3 present regression results with various added controls. The first column controls only for the precinct-level share of voters not voting for the incumbent in the prior election (1999). Note that 4 precincts were not present in 1999, so our sample size declines to 186 when we add this control. The coefficient is highly significant and close to 1. The precinct fraction of white families who lost the school choice lottery is positive and highly significant with a coefficient of 0.437. The second column adds controls for additional precinct-average student characteristics. The size and significance of the coefficient on fraction of students who were white and lost the lottery is similar across the two specifications. Column 3 adds fixed effects for the 6 School Board Districts. Each of these districts is represented by a school board member. Although these members were not up for re-election (recall only the at-large members were on the ballot), it may be the case the voter behavior differs across these districts. Adding these variables decreases the significance of the coefficient of interest to the 10% level, but it does not change the point estimate significantly. Taken as a whole, the results in Table XI suggest that lottery losers who were likely voters turned out at the polls and voted against the incumbent school board chair.

6   Conclusion

This paper provides empirical evidence on the factors that influence the decision to vote by using a unique policy experiment that randomized economic outcomes across potential voters. Overall we do not find a significant effect of losing the school choice lottery on voter turnout. However, losing the school choice lottery significantly increased the probability of voting in the ensuing school board election among likely voters – whites or high income households that voted in the prior election. The significant impact of losing the lottery among likely voters is consistent with results from door-to-door canvassing experiments (Green and Gerber (2004)), which find that canvassing and get-out-the-vote efforts have greater effects on regular voters than on infrequent voters, particularly in low turnout elections such as municipal elections. This paper adds further evidence on the motivation to vote by examining the impact of actual economic outcomes, exploiting randomization generated by public policy.

The empirical results suggest an asymmetric effect: losing the school choice lottery led to increased voter turnout among likely voters, but winning the lottery did not seem to have an effect on voting behavior. These results are consistent with retrospective and expressive models of voting behavior, where negative outcomes motivate more than positive outcomes do. It is also consistent with Hirschman's (1970) ideas of Exit, Voice, and Loyalty. In a monopoly product market, like public education, consumers (parents) may not be able to easily exit in response to dissatisfaction with firm product quality or firm policy. When exit is not possible, the primary means to express frustration and dissatisfaction is through voice, which in this case may be expressed through the polls.

This result has important implications for the political economy of public schooling and the provision of public goods more broadly. The results imply that personal disappointment or negative outcomes provide a strong motivation to vote among higher-income and past election participants. This suggests that the optimal political strategy for those seeking re-election may be to minimize losses to subgroups of higher-income constituents. Even within income or within voting propensity, if negative outcomes disproportionately increase voter turnout, then policies that hurt a minority but

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benefit the majority may be politically unviable. Within the provision of education as a public good, these results also bring into question predictions of public good provision based on a median voter model or any rational choice model of voter behavior. Concepts of efficient sorting, equilibrium quality provision, optimal allocation, and mechanism design in a public school choice program need to consider the political viability of public school programs designed to increase competition and school quality under public school choice. School district policies that seek to increase school quality provision or choice options to less advantaged communities at a cost to a minority of affluent constituents may not be politically feasible.
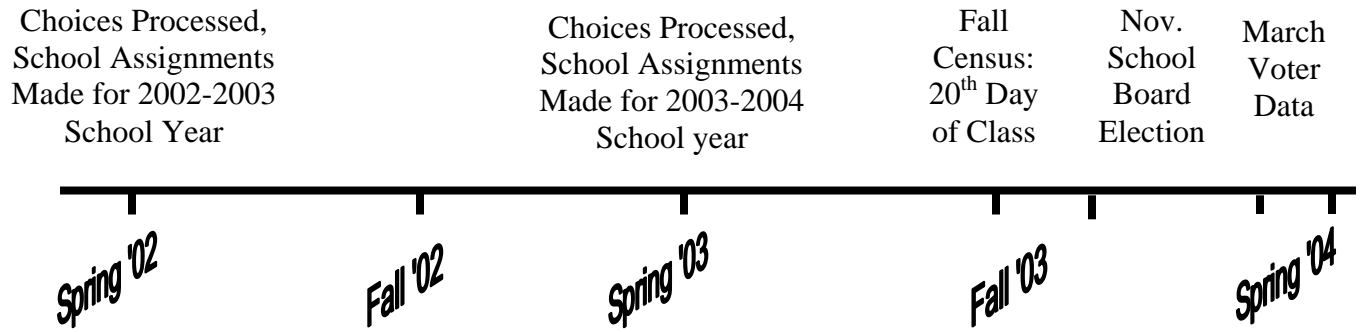
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Figure I: Timeline of Events

Choices Processed, School Assignments Made for 2002-2003 School Year

Choices Processed, School Assignments Made for 2003-2004 School year

Fall Census: 20th Day of Class

Nov. School Board Election

March Voter Data

Spring '02

Fall '02

Spring '03

Fall '03

Spring '04

Table I: November 4, 2003 School Board Election: At-large Candidates

Candidate Name	Occupation	Important Issues	Votes Received
Kaye McGarry	Business Owner/ Author/ Speaker	Reprioritize budget so that more is spent on teachers and less on bureaucracy, increase qualified teacher retention	37,164
Joe (Coach) White	Retired Football Coach	Increase funding, increase community involvement and improve relationship with School Board	31,360
Kit Cramer	Group Vice President for Education, Charlotte Chamber	Student achievement, reduced teacher turnover	31,004
Wilhelmenia Rembert***	University Administrator and Tenured Professor, Current School Board Chair	Enhance teacher quality and compensation, improve student achievement for all groups of students	30,602
Mike Kasper	Controller	Simplified and transparent budget, establishment of 'Neighborhood Schools Zones' that are permanent	24,863
George Dunlap	Police Officer	Student achievement, fiscal responsibility	22,651
Larry Bumgarner	Information Not Available	Information Not Available	14,886
Rachel B. Hall	Information Not Available	Information Not Available	9,529
Queen Norwood Thompson	Social worker/ Drop-out counselor	Accountability system that assesses quality of education for each child not just based on test scores, empower inner-city schools through specialized programs	5,868
Fred Marsh	Retired Small Businessman	Higher test scores, lower drop out rates	5,054
Nick Holley	Campaign Manager for Kim Holley for US Congress	Reducing mobile classroom units, increasing CMS student achievement standards	4,544

Notes: Top three candidates won the election. ***Wilhelmenia Rembert was incumbent chair who lost the election by 402 votes. Data Sources: Election totals are from Mecklenburg County Board of Elections. Candidate information taken from the candidates' written information about themselves and their positions as printed in the Charlotte Advocates for Education voting guide for the November 4, 2003 election.

Table II: Summary Statistics from Voting Data

	Mecklenburg County	Registered Voters	Voters in 2003 Election
Demographics:			
Percent White	58.04%	71.12%	73.65%
Percent Female	51.14%	54.94%	55.32%
Own Block-group and Race			
Median Income in 2000 Census	$50,579	$61,294	$66,261
Party Affiliation:			
Percent Democrat	---	42.69%	45.80%
Percent Republican	---	35.59%	39.52%
Total N	736,815	427,133	97,258

Notes: Data from Mecklenburg County Board of Elections March 2004 Voter file and North Carolina State Board of Elections, and the US Bureau of the Census, 2000 Decennial Census, State and County Quick Facts and 2003 American Community Survey

Table III: Student Characteristics

	All Students	Randomized
Student Demographics:		
Black	41.2%	53.9%
Female	49.6%	51.4%
Free or Reduced Lunch	33.1%	37.8%
Own Block-group and Race		
Median Income in 2000 Census	$55,670	$53,012
Choice School Characteristics:		
Average Combined Scores	0.051	0.085
Percent Free or Reduced Lunch	36.3%	36.6%
Home School Characteristics:		
Average Combined Scores	-0.074	-0.205
Percent Free or Reduced Lunch	41.0%	47.4%
Number of Students	92,789	9,408

Notes: Data from Charlotte-Mecklenburg Schools. Statistics on All Students taken from the 2002-2003 school year. Randomized groups include students in 2002-2003 and 2003-2004 school lotteries for whom lottery number alone determined assignment.

Table IV: The Impact of Random Assignment to First-Choice School on Attrition

Variable	Mean	Regression Adjusted Difference: Lottery Winners vs. Lottery Losers		
		(1)	(2)	(3)
	All Students	All Students	White	Non-White
2002-2003 and 2003-2004 Randomized Groups: Not Present in Fall 2003 Student Census	0.141	-0.025**	-0.057***	-0.013
		(0.009)	(0.017)	(0.009)
		N=9,408	N=3,344	N=6,064
2002-2003 Lottery Randomized Groups: Not Present in Fall 2003 Student Census	0.158	-0.021	-0.054**	-0.005
		(0.011)	(0.020)	(0.012)
		N=6,452	N=2,243	N=4,209
2003-2004 Lottery Randomized Groups: Not Present in Fall 2003 Student Census	0.103	-0.029	-0.063	-0.025
		(0.015)	(0.033)	(0.014)
		N=2,956	N=1,101	N=1,855

Notes: Each entry in the table is from a separate regression of an indicator of attrition on whether the student was assigned to her first-choice school, controlling for lottery-block fixed effects and the following baseline covariates: black (for All Students only), female, free- or reduced-lunch status, median income. Standard errors adjust for clustering at the lottery-block level. Asterisks indicate significance (*=.05, **=.01, ***=.001).

Table V: Characteristics of the Randomized Groups

Variable	Won Lottery	Lost Lottery	Regression Adjusted Difference
Student Characteristics:			
White	0.326	0.337	0.007
			(0.009)
Female	0.519	0.521	0.0001
			(0.013)
Free or Reduced Lunch	0.353	0.423	-0.031*
			(0.014)
Own Block-group and Race Median Income 2000 Census	$51,659	$52,295	212.580
			(526.713)
Home School Characteristics:			
Average Combined Score	-0.227	-0.214	0.006
			(0.008)
Percent Free or Reduced Lunch	0.488	0.479	-0.001
			(0.005)
Percent Black	0.529	0.525	-0.006
			(0.005)
Prior Household Voting Behavior: Household Voted in 2001	0.211	0.206	0.009
			(0.011)
N	3,478	4,607	8,085

Notes: Adjusted difference reports the coefficient on whether the student was assigned to her first-choice school from separate regressions with each variable in the first column as the dependent variable, controlling for lottery-block fixed effects. Standard errors adjust for clustering at the lottery-block level. Asterisks indicate significance (*=.05, **=.01, ***=.001).

Table VI: The Impact of Winning or Losing the Lottery on Voting in *2003* Election

Dependent Variable: Indicator if at least one member of student's household voted in *2003* election	(1) All Students	(2) White	(3) Non-White
Randomized Outcome:			
Lost Lottery	0.131	0.327*	-0.036
	(0.095)	(0.139)	(0.135)
Student Baseline Characteristics:			
White	0.239*	--	--
	(0.096)	--	--
Female	-0.016	0.010	-0.045
	(0.082)	(0.120)	(0.106)
Free or Reduced Lunch	-1.016***	-11.975***	-1.071***
	(0.260)	(0.758)	(0.294)
Median Income (demeaned)	0.007***	0.011***	0.005
	(0.002)	(0.003)	(0.003)
Household Voted in 2001	3.086***	2.624***	3.471***
	(0.087)	(0.112)	(0.126)
Mean of Dependent Variable	0.227	0.367	0.166
Total Observations	7,365	2,432	4,602
Log Pseudolikelihood	-2114.496	-930.437	-1004.351

Notes: Conditional (fixed-effects) logit estimation with lottery-block fixed effects; standard errors adjust for clustering at the lottery-block level. Asterisks indicate significance (*=.05, **=.01, ***=.001).

Table VII: Specification Checks
Landscape Format on Different Page

Table VIII: Comparing Characteristics of Status-quo and Randomized Groups

Variable	Status-quo	Randomized	Regression Adjusted Difference: Without Probability Weights	Regression Adjusted Difference: With Probability Weights
Student Baseline Characteristics:				
White	0.690	0.332	0.317***	0.0006
			(0.024)	(0.023)
Female	0.501	0.520	-0.016	-0.027
			(0.010)	(0.026)
Free or Reduced Lunch	0.195	0.393	-0.280***	-0.044
			(0.046)	(0.028)
Median Income (Demeaned)	16.655	1.021	13.524***	0.363
			(1.509)	(1.783)
Household Voted in 2001	0.317	0.208	0.129***	0.004
			(0.016)	(0.023)
N	7,966	8,085	16,051	13,988

Notes: Adjusted difference reports the coefficient on whether the student was in the status-quo group from separate regressions with each variable in the first column as the dependent variable, controlling for lottery-block fixed effects. Standard errors adjust for clustering at the lottery-block level. Asterisks indicate significance (*=.05, **=.01, ***=.001).

Table IX: Weighted Results of Losing the Lottery Versus Status-quo on Voting

Variable	OLS Estimation Dependent Variable: Indicator if at least one member of student's household voted in *2003* election			OLS Estimation Dependent Variable: Number of members of student's household who voted in *2003* election		
	(1)	(2)	(3)	(4)	(5)	(6)
	All Students	White	Non-White	All Students	White	Non-White
Lost Lottery	0.037*	0.086***	0.007	0.051**	0.122***	0.010
	(0.014)	(0.025)	(0.010)	(0.019)	(0.035)	(0.013)
Status-quo Group	0.004	-0.011	0.028	0.006	0.003	0.028
	(0.022)	(0.041)	(0.015)	(0.028)	(0.052)	(0.020)
Total Observations	13,988	6,876	7,112	13,988	6,876	7,112
Adjusted R-squared	0.4036	0.3916	0.4347	0.4751	0.4567	0.4988

Notes: OLS estimation with lottery-block fixed effects; standard errors adjust for clustering at the lottery-block level. Asterisks indicate significance (*=.05, **=.01, ***=.001). Regressions include baseline controls: race, gender, median income, voting history, free- and reduced-lunch status.

Table X: The Impact of Losing the Lottery on Voting: Interactions of Lottery Outcomes with Race, Income, Prior Voting History, and School-Level Academics

Dependent Variable: Indicator if at least one member of student's household voted in *2003* election	(1)	(2)	(3)	(4)
Randomized Outcome:				
Lost Lottery	0.120	-0.018	-0.030	-0.029
	(0.126)	(0.138)	(0.151)	(0.151)
Lost Lottery*White	-0.022	-0.045	-0.046	-0.045
	(0.172)	(0.168)	(0.167)	(0.166)
Lost Lottery*Median Income	0.010*	0.010*	0.010*	0.010*
	(0.004)	(0.004)	(0.004)	(0.004)
Lost Lottery*Median Income Squared	-0.00007	-0.00006	-0.00006	-0.00006
	(0.00006)	(0.00006)	(0.00006)	(0.00006)
Lost Lottery*Voted in 2001	--	0.347*	0.345*	0.345*
	--	(0.164)	(0.164)	(0.164)
Lost Lottery*(Score First Choice – Score Home School)	--	--	0.049	--
	--	--	(0.182)	--
Won Lottery*(Score First Choice – Score Last Year's School)	--	--	--	-0.035
	--	--	--	(0.184)
Lost Lottery*(Score Home School – Score Last Year's School)	--	--	--	-0.075
	--	--	--	(0.280)
Total Observations	7,365	7,365	7,365	7,365
Log Pseudolikelihood	-2111.204	-2108.712	-2108.476	-2108.374

Notes: Conditional (fixed-effects) logit estimation with lottery-block fixed effects; standard errors adjust for clustering at the lottery-block level. Asterisks indicate significance (*=.05, **=.01, ***=.001). Regressions include baseline controls: race, gender, median income, median income squared, voting history, free- and reduced-lunch status, and all school level academic variables that are interacted with winning or losing the school choice lottery.

Table XI: Relationship Between Precinct-Level Election Results and Losing the Lottery

Dependent Variable: Precinct fraction of votes against incumbent in *2003* election	(1)	(2)	(3)
Constant	0.078***	-0.011	0.0002
	(0.017)	(0.045)	(0.047)
Precinct Fraction of Votes Against Incumbent in Prior Election	0.916***	0.929***	0.908***
	(0.026)	(0.038)	(0.041)
Precinct Fraction of Students Who Are White and Lost the Lottery	0.437***	0.392**	0.278
	(0.124)	(0.135)	(0.171)
	--	0.090*	0.097
Precinct Fraction White	--	(0.044)	(0.051)
	--	0.106*	0.113*
Precinct Fraction Free or Reduced Lunch	--	(0.051)	(0.054)
	--	-0.0001	-0.0001
Precinct Average Median Income	--	(0.0002)	(0.0002)
School Board District Fixed Effects	No	No	Yes
R-squared	0.9150	0.9182	0.9212
N	186	186	186

Notes: Weighted OLS regression estimation with robust standard errors. Observations (precincts) are weighted by total voter turnout in the precinct in 2003 election. Asterisks indicate significance (*=.05, **=.01, ***=.001).