

The Social Cost of Open Enrollment as a School Choice Policy

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August 2009

We evaluate the integrating and segregating effects of school choice in a large, urban school district. Our findings, based on applications for fall 2001, suggest that open enrollment, a school-choice program that does not have explicit integrative objectives and does not provide busing, segregates students along three socioeconomic dimensions – race/ethnicity, student achievement and parental-education status. Using information on expenditures to promote integration at the district, we back out estimates of the social cost of open enrollment realized in terms of student segregation. Our social-cost estimates range widely depending on the weights that we place on the different dimensions of integration. However, even using conservative valuations of the different integrative measures suggests a social cost at this single district of over 3.4 million dollars (in year-2000 dollars). When considered in the context of the nation as a whole, where open-enrollment programs are commonplace, this estimate from a single district is substantial. However, we also note that there may be benefits not related to integration that counterbalance some or all of these costs.

* We would like to thank Karen Bachofer, Alan Bersin, Sandra Robles, Patricia Trandal, Peter Bell, Jeff Jones, Susie Millet, and Charles Rynerson for many helpful conversations and access to and help with data. We thank reviewers of an earlier version of this work, Jaime Calleja Alderete, Ken Hall, Paul Hill, Christopher Jepsen, and Mark Schneider, for helpful comments. The underlying project that provided the data for this study has been funded by a number of organizations including The William and Flora Hewlett Foundation, the Public Policy Institute of California, The Bill and Melinda Gates Foundation, the Atlantic Philanthropies and the Girard Foundation. None of these entities has funded the specific research described here, but we warmly acknowledge their contributions to the work needed to create the database underlying the research.

While much of the recent attention devoted to school choice has focused on the achievement-based benefits to student movers (for example, see Cullen, Jacob and Levitt, 2006; Angrist et al., 2002), the historical roots of school choice lie in integrative reforms dating back to the civil rights movement.¹ Today, the persistence of neighborhood-level segregation across the country suggests that school choice continues to be important as an integrative tool. There are many reasons to expect society to value the integration of school-aged children. For one, it may reduce market inefficiencies resulting from discriminatory behavior later in life, particularly in diverse societies such as the United States.² Integration is also generally viewed as equity-improving and will increase social welfare given social preferences for equality. Regardless of *why* integration is valued by society, it clearly *is* valued by society. Many school districts across the country operate school-choice programs with explicit integrating objectives, or at the least, with operating structures designed to elicit integrative student movement. These programs are costly and indicate a direct willingness-to-pay for integration.

Not everyone agrees that school choice can be effective as an integrative tool. While proponents of school choice argue that it can help to break the link between segregation across neighborhoods and schools, opponents contend that it will result in a significant fraction of students, most likely the least advantaged, being left behind. In leaving these students behind, opponents argue that school choice will further *segregate* schools along racial and socioeconomic lines. This paper disentangles the integrating and segregating effects of school choice at the San Diego Unified School District (SDUSD), the second-largest school district in the state of California and the eighth-largest nationwide. At the time covered by our study, 2001,

¹ For recent studies looking at integration reform around the desegregation era, see Guryan (2004), Reber (2005) and Cascio et al. (2008).

² There is considerable evidence that discriminatory behavior continues to persist in the modern economy. See, for example, Antonovics and Knight (2009), Holzer and Ihlanfeldt (1998) and Nardinelli and Simon (1990).

the school-choice program at SDUSD involved three components – the Voluntary Ethnic Enrollment Program (VEEP), the magnet program, and the open-enrollment program (which is called “Choice” in California).³ The former two programs are rooted in integration-based reforms dating back to the 1970’s and have integrative structures, while the latter is an unstructured statewide program mandated in the 1990’s.⁴

The Voluntary Ethnic Enrollment Program (VEEP) was originally designed with the explicit goal of mixing white and non-white students to make within-school student populations more representative of the district’s overall diversity. The VEEP program originated as part of the district’s response to the 1977 *Carlin v. Board of Education* decision, where the California Supreme Court determined that 23 San Diego schools were racially segregated and ordered the district to integrate them. After California passed Proposition 209 in 1996, it became illegal to provide programs that gave racial preferences. The VEEP program continued, but took a broader view of integration, focusing on economic disadvantage. District-provided busing is available to students who participate in the VEEP program. The program’s busing pattern is designed to move students between less affluent and more affluent neighborhoods. Schools in less affluent areas are matched to a set of schools in more affluent, predominantly white areas, in what are called allied patterns. Officially, a student attending a school in a VEEP allied pattern can apply to be bused to any other school in the same allied pattern. In practice, students who participate are bused from less affluent higher-minority schools to more affluent lower-minority schools. Although any student of any race can apply to attend any school in the VEEP busing pattern, the

³ Since that time VEEP program has been renamed to the Voluntary Enrollment Exchange Program, and a new form of school choice, Program Improvement School Choice, based on the choice requirements in the federal No Child Left Behind law, has been implemented. Neither of these reforms has radically altered school choice in the district. The latter form of school choice has largely used existing bus routes provided by the VEEP and magnet programs.

⁴ We briefly describe each program below. For a more detailed description with additional background information, see Zau and Betts (2005).

pattern is such that student-movement through the VEEP program should have an integrating effect on the district.

The magnet program was also part of the district's response to the 1977 *Carlin v. Board of Education* decision, and similarly to VEEP it was designed with integration as an explicit objective. At its inception, the magnet program typically sought to attract students from primarily white areas to primarily non-white areas by offering specialized curricula and additional resources such as reduced teacher-student ratios, teaching labs, field trips, and so on. A few magnets were established in relatively affluent areas in the hope of attracting students from less affluent areas. Similarly to the VEEP program, transportation is provided by the district for magnet students. Again, while any student can apply to any magnet school, the design of the magnet program is such that it should also exert integrating pressure on the district.

The open-enrollment program is available to students statewide and places no restrictions on student movement, conditional on space availability. While the open-enrollment program is the least restrictive in terms of student options, it does not provide transportation for student participants. This appears to be a common feature of open-enrollment programs nationwide, as a lack of structure to these programs makes large-scale busing infeasible.⁵ The expected effects of the open-enrollment program on district-wide integration are unclear *ex ante*. On the one hand, participants in this program may be more likely to come from families whose residential-location options, and therefore local-school options, are limited financially. Students from these families could use the open-enrollment program to attend more desirable schools. To the extent that this is the case, it should increase integration district-wide as disadvantaged students relocate to schools in more advantaged neighborhoods. However, participation in the open-enrollment

⁵ One notable exception, although there may be others, is Seattle Public Schools, which offers a limited form of open-enrollment with busing. However, in most cases busing does not appear to be a component of open-enrollment policy. For example, there is no busing provided for the statewide programs in California, Iowa, or Minnesota.

program may be constrained by transportation costs and time costs for some families because the program does not provide busing. If these costs deter disadvantaged families from participating and only students from relatively advantaged families change schools using the open-enrollment program, it could segregate the district.

We consider the effects of these three school choice programs on integration by race, student achievement and parental education levels.⁶ The former measure is often the focal point of integration-based school choice policy, as is the case here, but the latter two measures also inform the integration debate.⁷ For example, if the provision of equity in education is an objective of school choice policy, student mixing along non-race dimensions will provide important information about whether school choice programs are successful in this way.

One overarching theme in our analysis is that students use all three choice programs to attend schools that are more socioeconomically advantaged than their local schools. Therefore, participation by minority and disadvantaged students in these programs exerts integrating pressure on the district overall. However, participation by advantaged students, who are also seeking to improve the socioeconomic status of their peers, exerts *segregating* pressure on the district. Not surprisingly, the VEEP and magnet programs, which originally had been structured based on court orders to desegregate and offer busing services, integrate SDUSD by race. These programs also integrate the district by student achievement and parental-education status.

⁶ Another dimension along which integration is relevant in San Diego is English-Learner status. However, our social cost estimates are more likely to be externally valid if we do not factor in the integration of English Learners, who make up a much larger share of the San Diego student population than is seen in most other school districts.

⁷ For example, Reback (2008) shows that test-score performance has non-negligible effects on the demand for school choice across districts and Jacob and Lefgren (2007) show that low-income parents strongly value student achievement when making requests for individual teachers in elementary schools.

Alternatively, the open-enrollment program applies segregating pressure on the student population across all three measures of integration that we consider.⁸

The open-enrollment program (and others like it) is casually viewed as costless because it does not provide busing, which essentially means that accounting costs are near zero.⁹ However, the segregating effects of the open-enrollment program imply a social cost as evidenced by district expenditures on the VEEP and magnet programs to promote integration. In fact, transportation expenditures from 1999-2000 devoted to moving students through the VEEP and magnet programs are explicitly referred to as “integration” expenditures by the district. By comparing the magnitudes of the segregating effects of the open-enrollment program and the integrating effects of the VEEP and magnet programs, we back out estimates of the actual costs of open enrollment, realized in terms of student segregation. Importantly, expenditures on these integrative programs by the time of our study did not simply reflect the verdict of a court, as San Diego was no longer under court supervision. Rather, the high degree of public popularity of the programs accounts for the continued spending on busing, which in turn justifies our use of this funding to infer society’s willingness to pay for integration.

Depending on the relative valuations that we infer society to place on the different aspects of integration, our estimates of the social cost of the open-enrollment program range from \$387,000 to \$10.45 million per year, or between 2.4 and 65.3 percent of the annual budget allocated to integration-based transportation expenditures at SDUSD (all dollar-cost estimates are based on dollars from the 1999-2000 school year). The wide range of estimates is the result of uncertainty over the valuations assigned to the different dimensions of integration. However,

⁸ Bifulco, Ladd and Ross (2009) provide similar evidence from Durham, North Carolina, showing that advantaged students use open-enrollment programs to segregate themselves from disadvantaged students.

⁹ Of course, some administrative costs are required for the program to operate. However, the primary expense associated with school choice is the provision of transportation.

even placing conservative valuations on the relative importance of the different integrative measures suggests a social cost of over \$3.4 million per year. Given that similar programs are found nationwide (for example, the open-enrollment program in San Diego is part of a state-wide mandate) this estimate indicates that on a national level, the social cost of open enrollment is quite large.

The remainder of the paper is organized as follows: Section I describes the dataset, Section II details the demand for school choice (which underlies and largely determines the ultimate integrative effects), Section III describes the integrative effects of the different choice programs, Section IV provides calculations of the social costs of open enrollment, and Section V concludes. Finally, we note that our objective is merely to provide a more accurate measure of the true cost of open enrollment beyond the simple accounting cost. We make no claims about open enrollment with regard to student benefits, which may include increased student achievement, higher student and parental satisfaction, and increased competition among schools, among other things.¹⁰

I. Data and Program Mechanics

The data for this project are based on applications to the three school choice programs at SDUSD for fall 2001, submitted to the district during the 2000-2001 school year. Across the district, roughly one in five students participates in one of these three programs. Our dataset includes basic demographic information about each student, including information on race, gender, parental education and English-learner status; as well as test-score achievement (from the Stanford 9 exam, when available) and student-level information on activity in the choice programs. Specifically, we know how each student acted on each available option in each school

¹⁰ In the recent literature, examples of studies that evaluate the *benefits* of school choice include Cullen, Jacob and Levitt (2006), Betts et al. (2006), Angrist et al. (2002), and Levin (1998).

choice program. We also have detailed micro-level data from each school in the district which we use to assemble information on the student-body compositions of schools. This facilitates comparisons between each student's local school and choice options. It also allows us to evaluate the integrative effects of school choice relative to a counterfactual where the school-choice programs did not result in any student movement based on applications for the 2001-2002 school year.

Appendix A describes the initial universe of choice applications and our final dataset. We do not include applications at the kindergarten level because we do not have demographic data for these students. We also exclude applications to the sixth grade because the choice set is extremely complex for these students, with some attending K-6 elementary schools and most attending K-5 schools. Unlike students in any other grade, students entering the sixth grade are unique in that they can use school choice to alter their schooling structures. We also excluded some observations missing basic demographic or application data. We ultimately use about half of the total number of applications for each program in our analysis. Of the omitted applications, roughly three in five are omitted because they are for kindergarten or the sixth grade, and two in five for other reasons. The proportions of dropped applications for kindergarten versus the sixth grade are roughly reversed in VEEP relative to the magnet and open-enrollment programs. However, beyond this difference, the appendix shows that the patterns of missing applications across the three programs are very similar. Furthermore, a by-grade-level analysis of the demand for school choice across the three programs suggests that there will be only slight differences in preferences between applicants to kindergarten and the sixth grade as compared to students in higher grades (ignoring any schooling-structure preferences), which is important for our comparative analysis.

In each school-choice program, students' applications to relocate to option schools are accepted based on space availability. If a school receives more applications than it has spaces available in a given grade, administrators hold a lottery to allocate the scarce school-choice slots. These lotteries are based on random-number assignments conditional on priority groups. Priority groups depend on whether the student has a sibling who already attends the option school, the time of year in which the application was made (before or after the deadline), and whether the student is transferring from another school within SDUSD or (rarely) from outside. The magnet program also gives preference to "continuity" applications (i.e., the student is making the transition from elementary to middle or from middle to high school, and was already attending a magnet school with a similar curricular theme). In addition to the above priority groups, the magnet program uses geographic clusters to determine program admittance. The district is divided into four clusters that differ by socioeconomic makeup. The clusters are ranked from one to four for each magnet such that top priority is given to the cluster that least resembles that magnet. For some magnet schools, applications are processed in strict order by cluster and then, within-cluster, by priority group. For others, fixed percentages of admittees must be accepted from each cluster and again, the above described priority groups are assigned within-cluster.¹¹ We omit continuity applications and applications made from outside of the district in our analysis. Student movement resulting from the former can be attributed to prior choice-program activities, and out-of-district applications are given such low priority that almost none are accepted.

We note that the lottery-based approach in the VEEP and magnet programs, and in particular the lack of preferences given to students of specific races, ethnicities or socioeconomic status, may seem at odds with their integrative objectives. However, Proposition 209, passed in

¹¹ Note, however, that within any given school all applicants are treated equally regardless of race or ethnicity. Priority depends on cluster-wide differences between the local and magnet schools.

California in 1996, makes it illegal to use race as an explicit selection criterion for admittance into these programs. Still, the district indirectly encourages racial, ethnic, and socioeconomic integration by the way it combines quite disparate schools into allied patterns for VEEP, and by its use of geographic clusters for magnet schools.

II. The Demand for School Choice

Table 1 shows the mean percentage-point difference in the racial/ethnic makeup between the schools that are applied to and the local schools of applicants for all applications, by race. For instance, the first row in the second column of the table shows the average difference in the percentage of white students between the choice and local schools of black applicants to the VEEP program. The extent to which choice programs have the potential to integrate the district depends on the degree to which the diagonal entries of a given panel are negative and the off-diagonal entries are positive, indicating that students are applying to schools with fewer students of their own race and more students of other races. The table clearly shows that all students are using the choice programs to apply to schools where a higher percentage of students are white.

School-choice participants similarly use the choice programs to improve the socioeconomic status of their peers as measured by student achievement and parental education. For our student-achievement analysis, we identify students as either above- or below-median performers based on their combined math and reading scores from the Stanford 9 exam, and evaluate student mixing among these two groups. For the parental-education analysis there is a large population of students for whom we do not have parental-education information.¹² We designate parental education as “high” if at least one parent attended some college, “low” if no parent has attended any college and “unknown” if the data are unavailable. We measure integration among all three groups but focus on the integration of students whose parents are

¹² One reason is that parental education is not input into the data system until students are tested, which does not occur until the second grade. However, this is just one factor and it cannot explain all of the missing data.

designated as having “high” and “low” parental education levels. Integration by student achievement and parental education may be of particular importance given the 2007 Supreme Court rejection of race-based preferences in school assignment decisions in Seattle and Louisville. In this case, Justice Anthony M. Kennedy suggested that districts may want to place greater emphasis on promoting integration along socioeconomic rather than racial lines.

Across all three dimensions of integration that we consider, students use the choice programs to attend schools at which students are more socioeconomically advantaged.¹³ This conclusion holds for all groups of students, including those that are themselves socioeconomically advantaged. As mentioned above, this means that participation by disadvantaged students should increase integration across the district but participation by advantaged students will further segregate students.

Participation by minority and disadvantaged students is much higher in the VEEP and magnet programs than in the open-enrollment program. This is likely because the VEEP and magnet programs are purposefully designed to serve more minority and disadvantaged students and because less affluent families will be constrained by transportation costs in their participation in the open-enrollment program. We highlight these participation differences by comparing the shares of students participating in the three choice programs to the shares of students in the district for each relevant group in Table 2. Minority and disadvantaged students are consistently over-represented in the VEEP program, (roughly) fairly-represented in the magnet program, and under-represented in the open-enrollment program. This under-representation is particularly peculiar because disadvantaged students should be more likely to participate in school choice based on the evidence presented here that students use choice programs to improve the socioeconomic standing of their peers. Put differently, advantaged

¹³ Tables analogous to Table 1 broken down by student achievement and parental education status are available from the authors upon request. We do not have test-score data for all students. We use just the fraction of our student sample for whom we have test scores in our analysis of this dimension of integration.

students are more likely to come from families that participate in the “primary” school-choice market – the housing market. Conversely, disadvantaged students should depend more heavily on the “secondary market”, operating through the district provided school-choice programs.^{14,15}

III. Effects of School Choice on Integration

We measure the integrative effects of the school choice programs using exposure indices. As an example, consider the exposure of black students to white students in the district. An exposure index reports, for the typical black student in the district, the proportion of students in his or her school who are white. The formula for such an index is:

$$(1) \quad \sum_j \left(\frac{x_j}{X} \right) * \left(\frac{y_j}{t_j} \right)$$

In (1), x_j is the number of black students at school j , X is the total number of black students in the district, y_j is the number of white students at school j and t_j is the total population at school j . Thus, the exposure index is a weighted average of the proportion of students who are white at each school with the schools’ shares of the overall black population serving as the weights.

We compare the actual district-wide exposure indices to counterfactual indices that we calculate by “undoing” all of the student movement associated with the 2000-2001 applicants to the school choice programs. The differences between actual student integration and our counterfactuals indicate the single-year effects of the school-choice programs on integration.¹⁶

¹⁴ The secondary market has all of the attributes of any other market save one conspicuously missing component – price. Because school choice programs are designed to provide equal access to education for all groups, it is against their purpose to allow price to serve as the market-clearing mechanism.

¹⁵ In addition to demand factors, supply constraints in the school choice programs also affect participation. See Koedel et al. (2009) for more information about the influence of supply constraints in the three programs.

¹⁶ As discussed in Section I and Appendix A, our exposure-index calculations are based on a subsample of the total application pool. As detailed in the appendix, the data omissions should not be problematic for comparisons across programs, which are of primary interest here. However, they will result in an understatement of the net single-year effects of the school choice programs. Roughly, our exposure-index calculations should be multiplied by a factor of two in each program to adjust for the missing applications.

Of course, we do not expect applications for a single year to change markedly the exposure of one group of students to another. However, we use this snapshot of one year's worth of school moves because for this subset of school choice participants we know exactly where they would have gone to school if they had not enrolled in any of the choice programs. This allows for an accurate calculation of the counterfactual.

Figure 1 shows district-wide changes in exposure for each of our three measures of integration. In each case we show the net change in exposure resulting from the combination of all programs and the change in exposure attributable to each program individually. Figure 1 focuses on exposure to the group that is the most sought after in each case – the most socioeconomically advantaged. Tables 3 and 4 provide the numerical details for all of our exposure-index calculations.

The first panel of Figure 1 shows that the VEEP and magnet programs unambiguously increase the exposure of whites to non-whites, and vice-versa. (We can sum the exposure of whites across racial groups to infer changes in exposure of whites to non-whites.) The open-enrollment program increases the exposure of whites to Asians but segregates whites from blacks and Hispanics. Notably, Asian students at SDUSD are much less likely to be disadvantaged than other non-white groups. While the VEEP and magnet programs integrate disadvantaged minorities with advantaged groups, the open-enrollment program is counterproductive in this sense.

The second panel of Figure 1 shows district-wide changes in exposure based on student achievement. Again, the VEEP and magnet programs apply integrating pressure along this dimension and the open-enrollment program segregates above- and below-median performers.

Dominated by the negative effect of the open-enrollment program, the overall effect of all three programs on integration by student achievement is *negative*.

The third panel of the figure shows integration by parental-education levels, with the integrating and segregating effects of the three programs mirroring those found in the race and student-achievement analyses. The parental-education exposure indices are somewhat clouded by the ambiguity surrounding the “unknown” parental education group. Figure 1 shows that integration between parental-education groups consists mostly of integration between students designated as having high parental education and students whose parental-education status is unknown. Looking specifically at the change in exposure between students from high and low parental education families, the effects of the choice programs seem fairly mild and again, the open-enrollment program applies segregating pressure.

IV. The Social Cost of Open Enrollment

Figure 1, and the corresponding Tables 3 and 4, imply a social cost of open enrollment as a school choice policy. Namely, the open-enrollment program segregates advantaged and disadvantaged students, while district expenditures on the VEEP and magnet programs suggest a willingness-to-pay for integration. As noted earlier, all three of these programs persist to this day, while court supervision ended in the late 1990’s and Proposition 209 in 1996 ended racial preferences. That a democratically elected school board continues to fund the VEEP and magnet programs is a testament to society’s continued willingness-to-pay for the integrative benefits of these programs.

To estimate the segregation-based costs of open enrollment, we use transportation expenditures on the VEEP and magnet programs at SDUSD to approximate society’s willingness-to-pay for integration. We then use this approximation to assign a dollar cost to the

segregation created by open enrollment. Note that in addition to their integrative effects, the VEEP and magnet programs will also offer benefits typical of non-busing school choice programs. These benefits may include direct benefits to student movers (and possibly stayers), increased student and parental satisfaction, and increased competition among schools for students. However, most of these benefits could be achieved without busing, and surely without targeted busing (like that used in the VEEP and magnet programs), if integration was not a direct policy objective. For example, one could argue that the district's open enrollment program itself could induce some of these effects just as well as the VEEP and magnet programs. And yet the district voluntarily pays for the transportation costs of VEEP and magnet schools, which remain extremely popular with parents. It is quite reasonable, therefore, that the busing expenditures associated with these two programs are designated as "integration" expenditures in the 1999-2000 SDUSD transportation budget.

The use of VEEP and magnet transportation expenditures as a proxy for willingness-to-pay for integration will understate the social cost of open enrollment for two reasons. First, although transportation costs should dominate administrative costs for the VEEP program, the magnet program is likely to have additional expenses associated with improving schools in disadvantaged areas to attract advantaged students. We do not have a measure for these magnet-program costs and therefore, they are omitted.¹⁷ Second, the use of an observed payment in place of true willingness-to-pay will further understate our social-cost estimate. For example, consider a consumer's purchase of good X at a price of \$Y. By observing the purchase, we know that the consumer was willing to pay *at least* \$Y, although we cannot observe consumer surplus and generally expect the consumer's true valuation to exceed \$Y. Similarly to this

¹⁷ Note that there are also likely to be other, non-integrative benefits to improving schooling inputs at magnet schools, which further justifies not including them as a cost that is specific to integration.

simple example, any surplus accruing to society through the district’s purchase of integration is unobserved. However, because we only have information on what the district actually paid for transportation related to the VEEP and magnet programs, we proceed with this lower-bound approach to estimate willingness-to-pay.

We must also estimate the quantity of integration that the district purchases for the price observed in the transportation budget. Our exposure-index calculations from the previous section are useful here, but imperfect. This is because our analysis, based on a single-year snapshot of the integrating and segregating effects of the three programs, measures integration *flows* whereas district-wide expenditures on integration are used to purchase integration *stocks*. In order for our flow-based integrative measures to be useful in estimating the social cost of open enrollment, it must be the case that the integrative effects of the VEEP, magnet and open-enrollment programs, measured in flows, are proportional to their respective effects on the stocks of integration at SDUSD. It is these stocks of integration that the district is purchasing through its operation of the VEEP and magnet programs.

The key assumption that we require in our cost-estimate analysis is detailed in equation (2). Namely, it must be the case that the ratio of the segregating effect of the open-enrollment program to the integrating effects of the VEEP and magnet programs, measured in *flows*, is approximately equal to the ratio of the effects of these programs on integration *stocks*. That is:

$$(2) \quad \frac{INT_o^F}{INT_v^F + INT_m^F} \approx \frac{INT_o^S}{INT_v^S + INT_m^S}$$

The subscripts on each term in (2) indicate the choice program (VEEP, magnet or open-enrollment). The superscript “F” denotes a flow effect and the superscript “S” denotes a stock effect, where by flow we mean the one-year change in the integration measure driven by our

cohort of study and by stock we mean the net integration in a given year that has resulted from all of the student movement from this and previous cohorts in each program. For example, INT_o^F is the integrating effect of the open-enrollment program along some dimension, such as the change in black-white exposure, measured as a “flow”, calculated using the exposure-index change generated by movements from one year of applications. This flow will be negative when the program segregates students.

Intuitively, the approximate equality in (2) will hold if relative student movement across the three school-choice programs in our cohort is similar to that of prior cohorts. This requires that two conditions be met. First, our observed cohort must be similar to other cohorts in demographics and school-choice preferences. Given the size of each cohort at SDUSD, where the student population exceeds 140,000, this seems quite reasonable. Second, student movement via the school-choice programs in our observed cohort must be supply-side constrained similarly to other cohorts. There are two issues to consider here. First, the relative magnitudes of flows across the three programs for the cohort for which we have data should be reflective of the respective program sizes in the district, which we address below (see Equation (3)). Second, the distribution of available choice slots within each program faced by our cohort of applicants should roughly mirror the district-wide distribution of active slots within each program. This condition would be violated if, for example, previous cohorts took up the most desirable school-choice slots prior to program entry for our observed cohort. In this case, our observed cohort would only be active in the choice programs along the fringes of what was left over by previous cohorts, and there would be a disconnect between the ratio of integration-flow effects and the corresponding ratio of integration-stock effects.

Although we do not have the data to empirically investigate this possibility, it seems unlikely for three reasons.¹⁸ First, because the schooling process is finite, even if some of the early entrants into the school-choice programs took the most desirable slots, these students would not retain these slots indefinitely – they would graduate, and/or move on from elementary to middle school, or from middle school to high school. Given a perpetual line of exiting school-choice participants, particularly desirable slots that were absorbed by previous cohorts should continually become available. Second, heterogeneity in preferences among students and parents over choice schools as documented by Betts et al. (2006) and Glazerman (1997) calls into question the very existence of a set of “clearly preferred” school-choice slots. Third, because the three choice programs have existed for several decades each, the system is roughly in equilibrium, meaning that there has not been a radical departure from typical enrollment patterns in recent years.

If we can plausibly rule out differential supply-side constraints in the within-program distributions of available slots, it is straightforward to adjust equation (2) to ensure that our relative flow magnitudes are representative of the relative stock magnitudes for each of the three choice programs. Zau and Betts (2005) report that roughly 6.4, 6.2 and 6.6 percent of the SDUSD population was actively participating in the VEEP, magnet and open-enrollment programs in the fall of 2001, respectively. We denote these participation stock percentages by P_V^S , P_M^S , and P_O^S .¹⁹ It is straightforward to convert these to the total numbers of participants, or stocks, in each of the three programs by multiplying each by $T/100$ where T is the total

¹⁸ In principle we could investigate the distribution of available slots in our cohort and compare it to the distribution of slots among all current participants. However, because we do not have reliable data on students’ local schools outside of our cohort of study we cannot determine what options were available to these students, a particularly relevant problem in the VEEP and magnet programs.

¹⁹ We cannot use this information on the number of participants in each program to directly calculate the programs’ integrative effects because for prior cohorts we cannot calculate the appropriate counterfactual. That is, we do not know students’ local-school assignments for the entire participant population.

enrollment in the district. We adjust our flow-effect estimates for the VEEP, magnet and open-enrollment programs in equation (2) to equate them in relative magnitudes with observed stocks:

$$(3) \quad \frac{INT_o^F \left(\frac{P_o^S (T / 100)}{N_o^F} \right)}{INT_v^F \left(\frac{P_v^S (T / 100)}{N_v^F} \right) + INT_m^F \left(\frac{P_m^S (T / 100)}{N_m^F} \right)} \approx \frac{INT_o^S}{INT_v^S + INT_m^S}$$

In (3), N_x^F , where $x=O, V, M$, represents the numbers of observed movers in each of the three choice programs in our data for this single cohort (that is, these are the corresponding flow counts). In words, the left-hand side of (3) scales up each integration-flow effect by the ratio of total participation in the given program to observed movers into the given program in fall 2001. The assumption implicit in this weighting formula is that students who joined the choice programs in prior years proportionally affected integration in the same way as those entering fall 2001. If this scaled-up ratio of integration effects is proportional to the ratio of the overall integration effects, $\frac{INT_o^S}{INT_v^S + INT_m^S}$, then we can measure the ratio of the overall integrative effects of open enrollment compared to the VEEP and magnet programs.

Assuming that this approximate equality holds, the social cost of open-enrollment measured by any dimension of integration, in dollars, can be estimated by multiplying the ratio on the left-hand side of (3) by the district's combined expenditures on the VEEP and magnet programs. If the ratio in (3) is negative it suggests a social cost and if it is positive (which does not occur here) it suggests a benefit in the sense that the open-enrollment program is providing

“free” integration to the district. If our interest is in integration along multiple dimensions, VEEP and magnet expenditures can be multiplied by a weighted average of the ratio in (3).²⁰

We estimate equation (3) using the flow-effect measures from Tables 3 and 4, scaled up by the ratios of district-wide program participation to observed movers from our single cohort of applications. For VEEP, magnet and open-enrollment, the respective scaling factors in equation (3) are approximately 17.15, 11.69 and 14.55. Our expenditure estimate comes from SDUSD’s Information Report for Student Transportation Services for the 1999-2000 school year, presented to the board of education in June of 2001, just prior to the school year for which our choice-application data are relevant. The report indicates that the district spent \$16 million to provide transportation for the VEEP and magnet programs in 1999-2000.²¹ That is, the cost of maintaining the integration *stocks* supported by the VEEP and magnet programs at SDUSD is roughly \$16 million per year, measured in 1999-2000 dollars. We combine our estimates of equation (3) with this cost information to calculate the social costs of open enrollment.

We initially assume that the district is only interested in racial integration, and in particular, the integration of whites with black and Hispanic students (disadvantaged minorities). This assumption follows most directly from the original integrative objectives of the VEEP and magnet programs. We assume the district is equally interested in integrating whites with blacks and Hispanics, meaning that we assign equal weight to white-black and white-Hispanic integration in the district. An alternative would be to re-assign black and Hispanic students as

²⁰ Although the change in exposure of, say, black students to white students is not equal to the change in exposure of white students to black students (for example, in Table 3 these measures for the VEEP program are 0.00140 and 0.00081, respectively), the flow-ratio in (3) is equivalent regardless of the direction from which exposure is calculated as long as it is calculated in the same direction for each choice program. Note that this is not precisely the case using the estimates in Tables 3 and 4 because these estimates are rounded.

²¹ Expenditure data specific to the VEEP and magnet programs could only be obtained from operations for the 1999-2000 school year. As long as the approximate equality in (3) holds across years, any year of expenditure data will be sufficient to calculate social cost. It is helpful that this estimate is from a year that is very close to the year from which we obtain our integration-flow measures (applications for fall 2001).

“disadvantaged minorities” and calculate new exposure indices; however, in this case the integrative effects for the much larger Hispanic population at SDUSD would dominate the integrative effects for black students.

Equation (4) illustrates our cost calculation based only on racial-integration effects. The flow-effect estimates are obtained from the upper-left panel of Table 3:

$$\begin{aligned}
 (4) \quad C &= \left[\frac{1}{2} * (\$16mil) * \left(\frac{0.00007 * (14.55)}{0.00081 * (17.15) + 0.00061 * (11.69)} \right) + \frac{1}{2} * (\$16mil) * \left(\frac{0.00001 * (14.55)}{0.00299 * (17.15) + 0.00060 * (11.69)} \right) \right] \\
 &= \left[\frac{1}{2} * (\$16mil) * (0.046) + \frac{1}{2} * (\$16mil) * (0.003) \right] \\
 &= \$387,000
 \end{aligned}$$

The first term in (4) represents the social cost of open enrollment measured in terms of segregating black and white students, approximately \$364,000, and the second term the social cost measured in terms of segregating Hispanic and white students, approximately 23,000.²² This implies a total cost of the open-enrollment program of roughly \$387,000 per year, or 2.4 percent of the transportation budget allocated to promote integration at SDUSD.

Our cost estimate skyrockets if we assume that the district also cares about integration based on other socioeconomic characteristics, primarily because the segregating effects of the open-enrollment program are much larger, in relative terms, along the other dimensions. For simplicity, consider the case where the district equally values integration by race, student-achievement, and parental education.²³ If we assign weights of one-sixth each for white-black and white-Hispanic integration (for a one-third total weight on racial integration) and one-third each to integration by student achievement and parental-education status, the costs of the open-

²² For ease of interpretation we show equation (4) using the flow-effect estimates as reported in Table 3; however, note that the entries in Table 3 are rounded such that, as shown, equation (4) does not exactly produce our cost estimate of \$387,000, which we obtain using the unrounded flow-effect estimates.

²³ We evaluate integration only between students designated as having high and low parental-education in these calculations.

enrollment program calculated analogously to equation (4) are \$129,000 for racial segregation, \$9.16 million for student-achievement segregation and \$1.16 million for parental-education segregation. That is, a total cost of approximately \$10.45 million dollars, or almost two-thirds of the total transportation budget allocated to promote integration.

The appropriate social cost measure surely lies somewhere in between the estimates of \$387,000 and \$10.45 million. On the one hand, it is unlikely that the district cares only about racial integration as race is often used as a proxy measure for social disadvantage more generally. On the other, given that the VEEP and magnet programs were specifically designed in the spirit of racial integration, it is also unlikely that equal value should be placed on all three integrative measures. However, note that even small weights on the non-race measures of integration quickly amplify the implied social cost of the open-enrollment program. For example, if we assign a weight of 80 percent to integration by race and just 10 percent to each of the other measures of integration, this would still imply a social cost of the open enrollment program that exceeds \$3.4 million.

When considered in the context of the nation as a whole, where open-enrollment programs are commonplace, the cost of this program in this single district is substantial. Many other parts of the country have open enrollment laws. Witte, Carlson and Lavery (2008) report that 19 states have mandatory open enrollment laws similar to the law in California, and 23 have voluntary open enrollment laws. Further, they find that open enrollment is quite popular among students and parents. For example, their calculations indicate that 5 and 6 percent of all enrollment in Minnesota and Colorado consists of *inter-district* open enrollment. This suggests that the share of open-enrollment students at SDUSD, 6.6 percent, is not abnormally high. Given that SDUSD represents roughly one out of 350 public school students nationally, even if other

districts on average enroll only one-fourth as many students in open enrollment in percentage terms, if the degree of segregation were similar, the total national cost of open enrollment programs could easily reach 300 million dollars per year.²⁴

V. Conclusion

Students (and their families) use school choice programs to improve the socioeconomic standing of their peers. With regard to race, this means that applicants use the choice programs to attend schools that are “more white”. This does not mean that families necessarily make decisions based on race, because race is correlated with many other factors. For instance, applicants also appear to use these programs to attend schools that have a higher proportion of above-median test score performers and more students who have highly educated parents. Because all students use school choice programs to attend schools with more socioeconomically advantaged peers, participation by disadvantaged students tends to increase integration while participation by advantaged students applies segregating pressure.

Of the three school-choice programs in place in San Diego, the open-enrollment program is the only one that segregates the school district. Unlike the other two programs, the open-enrollment program does not make use of busing patterns or geographic clusters to encourage racial/ethnic mixing, nor does it provide transportation to student participants. The net result is that disadvantaged students are under-represented in this program and it increases segregation by the three socioeconomic measures that we consider - race/ethnicity, student achievement, and parental education.

Direct expenditures by SDUSD aimed at increasing integration suggest a social cost of open enrollment, realized in terms of student segregation. We provide estimates of this cost that

²⁴ This is based on our \$3.4 million cost estimate, and SDUSD enrollment in fall 2001 of 140,000 students compared to 47.7 million in public schools nationwide that year (see Table 36 of National Center for Education Statistics, 2008).

depend on the relative valuations of integration along the three dimensions that we consider. Our most conservative estimate, which focuses solely on the segregating effects of open enrollment as measured by race/ethnicity and ignores the segregating effects as measured by student achievement and parental education status, implies that the open-enrollment program in San Diego has a social cost of \$387,000, or 2.4 percent of the “integration budget” at SDUSD. A slightly less conservative estimate suggests a social cost of approximately \$3.4 million.

Perhaps because the accounting costs associated with open enrollment programs are near zero, they are quite common. However, to the extent that integration is a specific objective of social policy, open enrollment is not costless. The purpose of this paper is not to paint open enrollment as a “bad” policy *per se*, but rather to provide a reasonable measure of its costs such that its benefits can be evaluated within the proper context. Our treatment of school choice as a mechanism to promote integration ignores other issues, and benefits, that may be important. For example, despite its segregating effects, the open-enrollment program may improve education efficiency by improving student-school matches. In San Diego there is no evidence of an efficiency effect, at least in terms of student achievement; however, if such an effect does exist or other benefits are perceived from open-enrollment policy, these benefits should be weighed against the segregation-based costs.²⁵ One clear possibility is that open-enrollment programs keep students in the public system by providing them with choices that dominate their private school options.

²⁵ If school choice increases education efficiency by improving student-school matches we would expect student achievement to rise for choice participants (at the very least). Betts et al. (2006) finds no consistent evidence of achievement gains for school-choice lottery winners in San Diego, with the exception of positive math effects for lottery winners who applied to magnet high schools. The open enrollment program showed no significant gains one, two or three years after the lottery. Other evidence is mixed. While Angrist et al. (2002) find positive school-choice effects, Cullen, Jacob and Levitt (2006) find little evidence that choice participants benefit from school changes and find that in some ways these students perform worse. Despite the mixed results in the literature, the queues of students and parents lining up to participate in different school-choice programs across the country suggest that there are real benefits – thus far, these benefits have not been consistently identified by the research community.

Finally, we conclude with a cautionary note. The cost estimates for open-enrollment that we provide here are obtained within the context of a particular school-choice system where other choice programs are also available. In the absence of the VEEP and magnet programs would the open-enrollment program still segregate the district? We cannot answer this question because we do not observe student behavior in the absence of these other programs. However, it is certainly possible, and even likely, that if the VEEP and magnet programs were discontinued some participants in these programs would choose to participate in open-enrollment. Depending on which types of students would use open-enrollment, this could increase or decrease the program's segregating effects. Perhaps this analysis is best viewed within the context of a multi-pronged school-choice program that includes busing programs for disadvantaged students. It seems clear that under these circumstances, open-enrollment will undo some of the integration created by these busing programs and in this way its true costs will substantially exceed its simple accounting costs.

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Figure 1. Changes in actual exposure generated by the choice programs.
 Note: The Choice program in this figure refers to the open enrollment program.

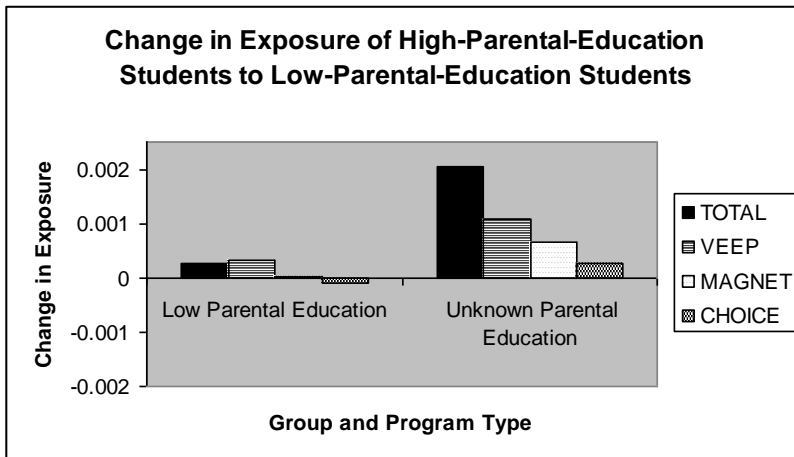
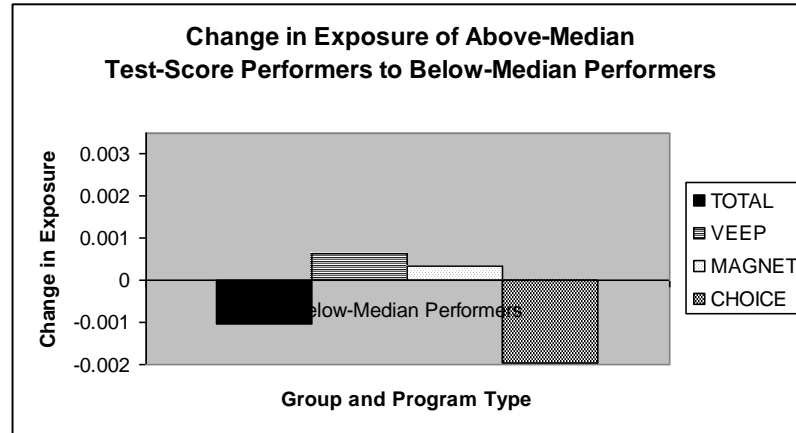
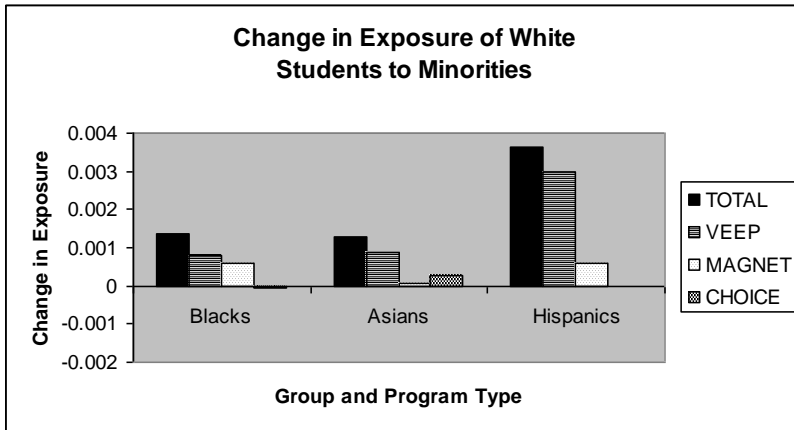


Table 1. Average Percentage Point Differences in the Racial/Ethnic Makeup at Option and Local Schools, as Implied by Application Data, by Applicant's Achievement and Program Type.

	<u>Applicant's Own Race</u>			
	<u>White</u>	<u>Black</u>	<u>Asian</u>	<u>Hispanic</u>
<u>VEEP</u>				
% White Diff	38.3	41.6	39.6	38.8
% Black Diff	-12.2	-19.4	-11.4	-11.4
% Asian/Pac Islander Diff	-5.9	-5.5	-12.3	0.4
% Hispanic Diff	-21.1	-16.9	-16.8	-28.1
Number of Applications	149	710	347	1696
<u>Magnet</u>				
% White Diff	1.4	12.4	10.9	14.8
% Black Diff	5.6	-3.6	-1.6	-2.0
% Asian/Pac Islander Diff	-3.8	-3.9	-6.4	-2.4
% Hispanic Diff	-4.1	-5.5	-3.6	-11.3
Number of Applications	897	1512	520	1634
<u>Open-Enrollment</u>				
% White Diff	10.8	10.2	13.4	11.3
% Black Diff	-3.0	-5.4	-2.9	-3.0
% Asian/Pac Islander Diff	-1.6	-3.5	-4.8	-2.9
% Hispanic Diff	-6.5	-1.4	-5.9	-5.5
Number of Applications	1486	881	620	1355

Table 2. Application Shares Relative to District-wide Population Shares, by Program and Group

	<u>Race</u>				<u>Test-Score Achievement</u>		<u>Parental Education</u>		
	<u>White</u>	<u>Black</u>	<u>Asian</u>	<u>Hispanic</u>	<u>Above-Median</u>	<u>Below-Median</u>	<u>High</u>	<u>Low</u>	<u>Unknown</u>
Share of SDUSD Population	0.27	0.16	0.18	0.38	0.50	0.50	0.27	0.19	0.54
<u>VEEP</u>									
Share of Applications*	0.05	0.24	0.12	0.58	0.35	0.65	0.18	0.25	0.57
Total Applications	149	710	347	1696	833	1575	532	717	1663
<u>Magnet</u>									
Share of Applications*	0.19	0.33	0.11	0.35	0.46	0.54	0.29	0.16	0.55
Total Applications	897	1512	520	1634	1690	1951	1324	731	2553
<u>Open Enrollment</u>									
Share of Applications*	0.34	0.20	0.14	0.31	0.57	0.43	0.32	0.14	0.55
Total Applications	1486	881	620	1355	1857	1421	1386	602	2400

*Note: we omit students who are not described by any of the racial/ethnic categories. Therefore, the “shares of applications” do not quite sum to 100 percent.

Table 3. District-Wide Exposure Indices by Race.

Exposure Group	White Exposure			Black Exposure		
	Whites to Blacks	Whites to Asians	Whites to Hispanics	Blacks to Whites	Blacks to Asians	Blacks to Hispanics
Actual exposure index in the district	0.11364	0.16964	0.27614	0.19598	0.18199	0.37314
Counterfactual exposure index if those who entered into option schools through any choice program had remained at their local school	0.11228	0.16835	0.27252	0.19363	0.18342	0.37618
Net effect on exposure index of all choice programs	0.00136	0.00130	0.00362	0.00235	-0.00143	-0.00304
Net effect on exposure index of all choice programs (Percent)	1.21430	0.77092	1.32924	1.21430	-0.77716	-0.80773
Net effect of VEEP Program	0.00081	0.00089	0.00299	0.00140	-0.00078	-0.00203
Net effect of VEEP Program (Percent)	0.72415	0.52920	1.09661	0.72415	-0.42263	-0.53886
Net effect of MAGNET Program	0.00061	0.00009	0.00060	0.00105	-0.00036	-0.00053
Net effect of MAGNET Program (Percent)	0.54080	0.05139	0.21930	0.54080	-0.19831	-0.13967
Net effect of OPEN ENROLLMENT	-0.00007	0.00028	-0.00001	-0.00013	-0.00032	-0.00055
Net effect of OPEN ENROLLMENT (Percent)	-0.06555	0.16672	-0.00481	-0.06555	-0.17260	-0.14682

Exposure Group	Asian Exposure			Hispanic Exposure		
	Asians to Whites	Asians to Blacks	Asians to Hispanics	Hispanics to Whites	Hispanics to Blacks	Hispanics to Asians
Actual exposure index in the district	0.24914	0.15498	0.27442	0.19432	0.15226	0.13149
Counterfactual exposure index if those who entered into option schools through any choice program had remained at their local school	0.24724	0.15619	0.27529	0.19177	0.15350	0.13191
Net effect on exposure index of all choice programs	0.00191	-0.00121	-0.00087	0.00255	-0.00124	-0.00041
Net effect on exposure index of all choice programs (Percent)	0.77092	-0.77716	-0.31437	1.32924	-0.80773	-0.31437
Net effect of VEEP Program	0.00131	-0.00066	-0.00030	0.00210	-0.00083	-0.00014
Net effect of VEEP Program (Percent)	0.52920	-0.42263	-0.10734	1.09661	-0.53886	-0.10734
Net effect of MAGNET Program	0.00013	-0.00031	-0.00035	0.00042	-0.00021	-0.00017
Net effect of MAGNET Program (Percent)	0.05139	-0.19831	-0.12678	0.21930	-0.13967	-0.12678
Net effect of OPEN ENROLLMENT	0.00041	-0.00027	-0.00028	-0.00001	-0.00023	-0.00013
Net effect of OPEN ENROLLMENT (Percent)	0.16672	-0.17260	-0.10040	-0.00481	-0.14682	-0.10040

Table 4. District-Wide Exposure Indices by Student Achievement and by Parental Education.

Exposure	Above-Median Performers to Below-Median Performers	Parental Education: High to Low	Parental Education: High to Unknown
Actual exposure index in the district	0.41656	0.23631	0.21599
Exposure index if those who entered into option schools through any choice program had remained at their local school (Counterfactual)	0.41758	0.23605	0.21394
Net effect on exposure index of all choice programs	-0.00102	0.00026	0.00205
Net effect on exposure index of all choice programs (Percent)	-0.24427	0.11054	0.95832
Net effect of VEEP	0.00062	0.00031	0.00109
Net effect of VEEP (Percent)	0.14848	0.13282	0.51136
Net effect of MAGNET	0.00035	0.00001	0.00064
Net effect of MAGNET (Percent)	0.083816	0.00477	0.30079
Net effect of OPEN ENROLLMENT	-0.00195	-0.00009	0.00026
Net effect of OPEN ENROLLMENT (Percent)	-0.46673	-0.03940	0.12316

Appendix A Data Appendix

Many of the applications to the school choice programs are missing information that we require to make inference about the integrative effects of school choice and the underlying demand for school choice. We omit these applications from our analysis. Our largest data omissions are due to students' grade levels - we omit applicants from students entering kindergarten and the sixth grade. For kindergartners, who apply prior to enrollment at SDUSD, we do not have student-level demographic information, making it impossible to infer integrative effects. Applicants for the sixth grade are omitted because heterogeneity in the schooling structure at SDUSD obscures the choice sets for these students, and, more generally, confounds our ability to identify the peer-group based demand for school choice among these students. The structural issue here is that some elementary schools at SDUSD end after the fifth grade while others end after the sixth grade. Therefore, unlike students in any other grade, students entering the sixth grade are unique in that they can use school choice to alter their schooling structures. Because no other students make school-choice decisions based on this additional dimension of demand that is unique to sixth-grade students, their inclusion in our analysis would be confounding. In addition to omitting students applying for entry into kindergarten and the sixth grade, we also omit all applications where key information is not available, including basic demographics, local schools, or grade levels, among other things.

Our original dataset contains the universe of applications to the three school-choice programs at SDUSD submitted in the 2000-01 school year for participation in the fall of 2001-02 (excluding continuity applications). Table A.1 details the pattern of omitted applications that leads to our final dataset, which contains approximately 46.5 percent of the original universe of applications. By far, the largest omission categories are for students who apply to the choice programs at the kindergarten and grade-6 levels. Note that although we omit a large number of applications from our analysis, the patterns of missing applications are very consistent across the three choice programs (treating the omissions of grade-k and grade-6 applications as equivalent in cause). For the purpose of our relative comparison of the three choice programs, the consistency across programs in data exclusion is most important.

Table A.1. Data Omissions.

	<u>VEEP</u>		<u>Magnet</u>		<u>Open-Enrollment</u>	
	<u>Count</u>	<u>Percent</u>	<u>Count</u>	<u>Percent</u>	<u>Count</u>	<u>Percent</u>
Universe of Applications	6453	100	9737	100	9401	100
Application for Grade K	-636	-9.9	-1949	-20.0	-2093	-22.3
Application for Grade 6	-1556	-24.1	-1039	-10.7	-1074	-11.4
Cannot determine current or next local school, and/or next grade	-687	-10.7	-931	-9.5	-1114	-11.8
Other application problems: outside the district, missing student-level data, application error*, etc.	-662	-10.3	-1210	-12.4	-732	-7.8
Final Application Count	2912	45.1	4608	47.3	4388	46.7

* For example, some VEEP applicants applied to schools that are not part of the busing pattern.