Moving On: Why Students Move Between Districts Under Open Enrollment

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July 2008

* The research in this paper was generously supported by a grant (#200600066) from the Spencer Foundation of Chicago, IL. We gratefully acknowledge that support.

Abstract

Over the past twenty years states have used various methods to expand the schooling options available to public school students and their parents. Many of these programs, such as charter schools, private school vouchers, and magnet schools are broadly recognizable and have been thoroughly studied in the academic literature. Other programs, such as interdistrict open enrollment, the focus of this paper, are less visible and have gone largely unstudied by academics and policy analysts. The dearth of studies on this topic occurs in spite of the fact that, in most states, interdistrict open enrollment policies serve more students than all other public school choice programs combined.

This paper attempts to partially fill this void in the literature by analyzing open enrollment patterns and trends in two states, Minnesota and Colorado. The paper begins by describing the political development of open enrollment in the United States broadly, with the situations in Colorado and Minnesota addressed in greater detail. It then moves on to analyzing the factors that affect the number of students choosing to open enroll into and out of a school district.

The analyses in this paper are based on detailed district-level data from the Minnesota and Colorado Departments of Education. We use two separate sets of models to study the open enrollment processes in each state. The first set of models, which we refer to as "macro" models, uses OLS to model the aggregate number of students entering and leaving a district under open enrollment. The second set of models, which we term "micro" models, use generalized least squares with random effects controls to model each open enrollment "transaction" between districts in terms of where student go or come from. In the micro analysis we employ the precise differences between districts with respect to several characteristics to try to understand the student flows.

Estimation of these models reveals that interdistrict transfer choices are based on multiple factors, including the socioeconomic characteristics and academic performance of school districts. Specifically, districts with higher percentages of students eligible for free lunch have more students open enroll out of the district and fewer students open enroll into the district than districts with lower percentages of students eligible for free lunch. A similar trend is seen for academic performance; high-performing districts have more students entering and fewer students leaving relative to their lower-performing peers. The policy implications of these findings cut in two directions. If interdistrict transfer becomes increasingly prevalent, as it already is in some of the metropolitan areas in this study, open enrollment will cause further segregation in terms of achievement levels and socioeconomic characteristics between districts. On the other hand, such transfers also allow families an easier route to a more desirable school system than residential location, which has been the traditional assignment mechanism.

I Introduction

For most of the twentieth century, public school students were assigned to schools based on district rules that defined geographic boundaries for each school in order to minimize families' distances from schools. Although exceptions could be granted, they rarely were. The first break in that system came with forced busing to achieve racial balances between schools. That system applied primarily to large city districts; smaller towns and rural areas stuck to the geographic proximity rule. In most cases, if a family wanted to change schools then they had to change their residential location.

Beginning in the late 1980s, however, several states passed laws designed to introduce various forms of parental choice into school assignment decisions. The most well known of these choice options are school voucher programs, but such programs were relatively rare; laws creating charter schools and open enrollment, both intra- and inter-district, were much more common. Voucher and charter laws allowed students to attend a school of their choosing within a district while open enrollment laws allowed movement between public school districts. A great deal of attention, by scholars, policy evaluators, and the media, has been given to voucher programs and charter schools. Very few studies have analyzed what may be the most important choice policy—open enrollment.

Voucher programs, although passing a seemingly critical constitutional hurdle in 2002 (*Zelman v. Harris, 2002),* have failed to expand since that decision. There are two prominent reasons. The first is the seemingly odd mix of political opponents. Liberal Democrats generally oppose vouchers on philosophical and interest group grounds (opposition by Democratic teachers unions) while Republicans are often only lukewarm

towards vouchers because they represent well-off districts with successful public schools and are leery of the potential increased cost of universal access to vouchers. The second factor that has served to limit the spread of voucher programs is the presence of provisions that either provide for "uniform" public education or explicitly bar support for private schools with public funds in many state constitutions. The former was cited in a Florida Supreme Court case that banned their state voucher program. The latter, known often as "Blaine Amendments,"[1] hang over many states as a more explicit prohibition than that contained, and overruled in *Zelman*, in the First Amendment to the U.S. Constitution.

Charter schools have continued to expand both in terms of state laws and the number of students they serve, although in recent years that growth has leveled off considerably. One of the reasons for this decreasing growth may be that charter schools are running out of areas in which to expand. Many metropolitan areas across the country are already served by charter schools, and additional development may saturate the market. Furthermore, few charters are likely to emerge in rural districts because such schools need to attract minimum numbers of students and because the competitive pressures induced by neighboring charters is much less than in "charter regions" around large cities (Witte, Schober, and Schlomer, 2007; Witte and Carlson, 2007).

Like charter schools, open enrollment may have also peaked in its use. The number of states with open enrollment laws has expanded from one in 1987 (Minnesota) to 42 today. Of these 42 states, 19 have "mandatory" open enrollment laws and 23 have "voluntary" laws (Education Commission of the States, 2008). Mandatory laws require

[1] Named after James G. Blaine, a politician from Maine who served as Speaker of the House and in the United States Senate in the mid- to late 1800s. In 1875, Blaine proposed an amendment to the U.S. Constitution that would ban the reception of public funds by any religious school.

school districts to promulgate policies governing open enrollment; voluntary laws allow such policies. Although these laws vary in the types of restrictions they place on both potential sending and receiving districts, the restrictions have in many cases lessened over time. A critical case, one in which the repercussions have yet to be felt in that states, came with the recent U.S. Supreme Court decision in *Parents Involved in Community Schools Inc. v. Seattle School District* (2007). In this case, the court ruled that school assignment systems could not be based on race alone. Because a number of open enrollment programs have provisions based on operative desegregation plans, those provisions are likely now unconstitutional and will no longer provide prohibitions to open enrollment.[2]

Unlike voucher and charter programs, there is no logical reason that any school districts will a priori rule out participating in open enrollment policies. The only obvious limits are geographic. There are limits on how far parents will send their children to school. Thus, districts with highly dense populations are more likely to be prominent participants in open enrollment than geographically larger, rural districts. Despite this caveat, all districts can play the open enrollment game to some degree.

This paper is organized as follows. The first section describes the concept of open enrollment and the laws in our two principle states – Minnesota and Colorado. That is followed by an outline of theoretical issues and hypotheses for engagement in open enrollment by families and school districts. We then present two forms of empirical

[2] That is the case in Madison WI. The Madison school district routinely prevented white students from leaving the district under open enrollment because of the negative impact of the move on its state-based desegregation plan. The district had been sued by denied white parents and, in light of *Parents Involved in Community Schools Inc. v. Seattle School District* has now asked for a state ruling on their policy. The prospect is that the state and districts will need to revise their open enrollment programs to be more permissible for those seeking to move to nonresident districts.

analyses: the first is a macro study based on simple student flows into and out of school districts under open enrollment; the second is a micro study based on "gold standard" data that allows us to model each open enrollment "transaction" between every local school district in each of our principle states. Finally, we offer conclusions and policy implications.

II Background

The Concept of Open Enrollment. In most states, open enrollment policies allow students, with some restrictions, to enroll into any school district in that state. The laws often require school districts to develop a plan that allows their students to attend public schools in other districts, and permits students from other districts to attend schools in their district. Many rationales are given for open enrollment. Some advocates tout market rationales that parallel the efficiency arguments for vouchers (Friedman, 1962). Others argue for simply increasing parental choice over the rigid residency systems in place up to the 1980s.

In almost all cases, the leverage of the laws is that when children move, some degree of state aid follows them. To prevent a range of potential problems or abuses, initial legislation often includes a number of possible restrictions that allow districts to block students from either leaving or entering the district. Common restrictions include limited space in schools or programs, program qualifications, athletic eligibility, and student behavioral problems or expulsion. Also, prior to the Supreme Court ruling in *Parents Involved in Community Schools Inc. v. Seattle School District*, movement of students that would have detrimental effects on desegregation plans was a common reason for denying students the ability to leave or enter a district.

Open Enrollment Laws. As indicated in the introduction, 19 states, including the two that serve as the focus of this paper, have mandatory open enrollment laws. On the other extreme, nine states have no laws allowing open enrollment whatsoever. In those states, if parents apply to attend schools in other districts, they are completely at the mercy of both the sending and receiving districts. The usual arrangement, because the student counts for state aid in his resident district, is for the family to pay "tuition" to the non-resident district. In the 23 states where there is a voluntary program only, districts again assume almost all of the powers. If school boards do nothing, any applications for exit or entry are considered on an ad hoc basis as in states without any programs. Even in mandatory programs, as exemplified by Minnesota and Colorado, districts may retain considerable powers over entry, and usually lesser powers over exit. That being said, in states with mandatory open enrollment programs, the numbers of students taking advantage of them is not trivial. For example, over 38,000 students, which accounts approximately 5 percent of total enrollment, open enrolled to a nonresident school district during the 2006-07 school year in Minnesota. As a point of comparison, fewer than 24,000 students were enrolled in charter schools (Minnesota Education Statistics Summary 2007). In Colorado, over 51,000 students, which represents over 6 percent of total enrollment, took advantage of the state's open enrollment policy during the 2006-07 school year.

This paper is part of a larger study of eight states that have both charter school and open enrollment programs. In terms of open enrollment, the laws of most of the states we include in the eight-state study have three features that almost invite districts to compete for students. First, in all states we study, the receiving ("non-resident") district

receives state aid for each child that enters the district. Second, the resident district must pay for special education services. Third, receiving districts rarely are required to foot the full cost of transporting non-resident students to their new school. In essence, each non-resident student means almost "free" revenue where space is easily available. Indeed, an early report on the Wisconsin program found that a third of district administrators were considering ways to retain students or attract students under open enrollment (Public Policy Forum, 1998).

Minnesota Law: Although voluntary inter-district transfer had existed as early as 1980, the first mandatory interdistrict open enrollment law was passed in Minnesota in 1987. For Minnesota, the law was an extension of statewide alternative schools, which allowed students desiring alternative education opportunities to attend any of a series of state alternative education centers.

The current Minnesota statute (124.D03 Minnesota State Statutes) is typical of mandatory laws in that it allows parents complete rights to apply to any school district, but also allows school districts to limit incoming, nonresident students under certain conditions. As in most state laws, some of the conditions are "blanket" conditions; individual school boards impose others. The starkest blanket condition allows non-resident districts to deny students who have been expelled for either possession of a weapon or drugs, selling drugs, or committing assault (124D.03, Subd. 1.). There is also a blanket rule that allows school boards to reject nonresident students if the number of applications in a specific grade exceeds either 1% of students enrolled in that grade or the number of resident students in a grade enrolled as nonresidents in another district (124D.03, Subd. 2.). Unlike some other states, Minnesota law does not mention

desegregation plans except to indicate that if a student helps fulfill such plans their application can occur at any time, thus voiding application deadlines (124D.03, Subd. 4).

Finally, school boards may adopt policies to control enrollment. They may include limits on the basis of overcapacity in any school program, class, or building. However, "standards may not include previous academic achievement, athletic or other extracurricular activity, disabling conditions, proficiency in English language, previous disciplinary proceedings, or the student's district of residency." (124D.03, Subd. 6) There has subsequently been a controversy over athletic status. Athletic eligibility is determined in most states by a statewide athletic association. Following Wisconsin's lead, Minnesota is currently considering requiring athletes who enroll under open enrollment, and who have completed their sophomore year, to sit out for a year before becoming eligible for sports (Associated Press Report, 7/4/2006). This continues a long, acrimonious debate over stealing hockey players that was a major point of contention during enactment of the initial open enrollment law in 1987.

Colorado Law: In Colorado, a statute passed in 1993 required districts to adhere to the mandatory inter-district open enrollment policy starting in the 1994-95 school year. The law gave priority to two groups of students: those with unsatisfactory proficiency ratings on state tests and those coming from schools with unsatisfactory ratings (Colorado Statures, 22-36-101, 2(a)). Districts were given relief from implementing the statute if it required new buildings, programs, or waiving age, course, or performance requirements. But they then required districts to enroll nonresident students unless one or more explicit exceptions were met. These exceptions included: 1) lack of space or teaching staff; 2) an explicit program requested is not offered or the facility is not equipped to handle it; 3) the

student does not meet program eligibility criteria; 4) admission is not in compliance with an established desegregation plan; and 5) the student has previously been expelled (22-36-101, 3(a-e)). Thus, as in Minnesota, but even more explicitly, Colorado districts can deny admission to nonresident students only under clearly defined situations. Unlike Minnesota, a general numerical cap on student transfers is not included in the statutes.

III Theories and Hypotheses

Movement between school districts under open enrollment requires actions by both families and school districts. Families must request a schooling change from their district of residence to an alternative district, and both the sending and receiving school districts must assent to the request. This sets up a three-unit decision set: families, resident school districts, and non-resident school districts. This paper analyzes why families choose to move and explores the motivations of both sending and receiving districts.

Several studies have tried to analyze the reasons parents and administrators gave for using open enrollment. An evaluation of the Wisconsin open enrollment program conducted for the state legislature found that district administrators thought that most students transferred for reasons of geography (Public Policy Forum, 1998). A plurality (40 percent) of parents with children participating in Minnesota's early open enrollment program cited "Convenience," a category including geographic proximity, parent work in the district, and daycare, among others, as the main reason for their participation. Only half as many reported that the academic quality or scholastic opportunities in another district led them to use open enrollment (Minnesota House of Representatives, 1990).

Family Decisions to Move On. The most common theoretical arrangement for studying family choice is what economists refer to as an educational production function.

- *Set I – Families Would Chose*:

    - Districts or schools with higher prior student achievement as measured by standardized tests;
    - Districts or schools with higher per pupil spending;
    - Districts or schools with smaller class sizes or lower student/teacher ratios;
    - Districts or schools with specific schools or program orientations thought to lead to greater achievement (e.g. desirable forms of charter schools).

Not as clear would be a set of important factors on which families may have differing views. These would include:

- *Set II - Families Will Vary On*:

    - Districts or schools with higher percent of low-income students;
    - Districts or schools with higher median family income in the school or district;
    - Districts or schools with higher percentages of racial minorities;
    - Districts with excess capacity in their schools;
    - Larger (or smaller) schools or districts.

Some families may decide that their child will learn more when the first three factors more closely match their own income and race; others may determine that higher income and lower numbers of racial minorities serve as a better predictor of achievement success for their child. Whether districts have excess capacity or not may also cut both ways. It will be easier for students to get into schools with open seats, but schools may have open seats because the school (or district) is not desirable. Similarly, families may interpret size differently. Some would argue that smaller sizes are more conducive to learning. Others may believe that larger schools and districts may be able to offer more services and programs more efficiently.[3]

Although less considered in academic studies, a range of factors not connected directly to student achievement may also significantly affect family school choices. The most obvious are:

- *Set III – Non-Academic Factors*:
    - Convenience – distance and transportation options to schools
    - Non-achievement related peer effects (friends);
    - Specific extra-curricular factors (athletics; music).

Although this study may eventually be able to study distance, as in most existing analyses, these factors are difficult to study and will not be included in this paper.

District Decisions. Both "sending" (losing) and "receiving" (gaining) districts are involved in the open-enrollment decision process. Although there may be asymmetric factors affecting each type of district, nearly all of the factors affect districts either in

[3] On this changing issue, the current vogue, stimulated by a small schools movement favored by such impressive forces as the Gates Foundation, is for small schools. The evidence over many studies is mixed for school size. District size is less studied and would be affected by the difficult problems of large districts and the varied characteristics of smaller districts (small suburban; small town; rural).

their capacity to try to block (or encourage) those who leave or to accept or reject those who apply for entry. We suggest three basic sets of factors affecting district decision-making.

- *Cash*. Districts will make decisions based on either losing or gaining state aid or its equivalent.
- *Students.* Districts will seek to maximize the number of students who either enhance their reputation or minimize their costs. Thus they may:
    - Seek (or fight the loss of) students with higher achievement;
    - Seek (or fight the loss of) specialized students such as athletes and musicians;
    - Avoid (or enhance leaving of) students with behavioral problems;
    - Avoid (or enhance leaving of) students with disabilities.
- *Space.*
    - Districts with space limitations will enhance student leaving and block student entry.
    - Districts with excess capacity will seek student entry and block student leaving
- *Desegregation.* Districts bound by desegregation programs will either seek racial minorities or block their exit.

Our hypotheses follow directly from these theoretical conjectures. We test these hypotheses using flows of students into and out of a district using open enrollment. Of the variables we can adequately measure, from the family point of view, everything else taken into account, open enrollment should increase into a district that has: 1) higher achievement; 2) greater spending; 3) smaller student teacher ratios; and 4) more special programs or schools (in this analysis more charter schools). Conversely, these

hypotheses work in the opposite directions for open enrollment out of a district. For the rest of the variables in Set II above, the a priori hypotheses are unclear.

From a district perspective, there are different motivations, and in some cases motivations that run counter to what we expect from parental choices. For example, the cash nexus, which should favor letting students into a district and blocking those that leave, could be either stronger or weaker given overall student spending. The effects of school spaces are pretty clear, and should trump the indecisive hypotheses concerning parental motivations. Districts with limited capacity will block entry, while districts with excess capacity will encourage it.

District behavior is quite clear on the rest of the factors indicated above. Whether these run counter to family preferences depends on the situation of the individual student. However, families and districts may be at odds on some, if not all of these factors. For example, families residing in relatively low-achieving districts will, on average, try to gain entry into higher achieving districts, but the higher achieving district is less likely to allow entry if it can prevent it. On the other hand, districts and families may be deciding in the same direction on special students (athletes) or attempts to gain entrance into special programs or charter schools.

IV Data

We empirically test the hypotheses presented above using data from two states—Colorado and Minnesota. We chose these states for two primary reasons. First, both states have well-established mandatory open enrollment laws that place relatively few restrictions on families' enrollment choices. Second, high-quality district-level data are

available on both open enrollment flows and potential correlates of those flows for both of the states we analyze. Together, these features allow us to design and conduct direct empirical tests of the hypotheses outlined above.

The data used in our analysis were collected from three main sources: the Minnesota Department of Education, the Colorado Department of Education, and the Common Core of Data (CCD), which is a database maintained by the National Center for Education Statistics (NCES). We obtained detailed district-level open enrollment flows for both Minnesota and Colorado from their respective state departments of education.[4] Most states with open enrollment data simply provide the number of students entering and leaving a district through the open enrollment policy; there is no documentation of the districts to which these students transfer or from which they come. Colorado and Minnesota provide such basic information, but they also maintain records that detail each district-level "transaction". That is, each state provides information on not only the total number of kids entering and leaving each district through open enrollment, but also on every district from which these students come and to which they go.

The Colorado and Minnesota departments of education also served as the sources of the standardized test score variables employed in our analysis. Unfortunately, the two states do not report test scores in an identical format or for the same grades. Minnesota reports the mean scale score for each district on both the math and reading tests for 3rd, 5th, and 8th grade. Colorado, on the other hand, reports the percentage of students in each district who are deemed proficient or advanced based on their test performance. For each

[4] All open enrollment data analyzed in this paper are from the 2003-04 school year. All variables used to predict open enrollment flows are from the 2002-03 school year. The predictor variables are from the prior year because families would have had to make their open enrollment choices for the 2003-04 school year during the 2002-03 school year.

district, results are reported for 5th, 7th, and 10th grades. As a result of these discrepancies, the test score variables for Minnesota must be interpreted differently from the test score variables for Colorado.

Finally, all of the charter school variables in our analysis are based on data collected from the two state departments of education. We employ five distinct charter school-related variables. The first of these variables indicates whether a district contains a charter school. The second variable measures the number of charter schools in the district. The third variable indicates whether a district is adjacent to at least one district containing a charter school. The fourth and fifth variables measure, for each district, the number of adjacent charter districts and the number of adjacent charter schools, respectively.[5]

All other variables in this analysis are based on data collected from the Common Core of Data. These district-level variables include the percentage of students eligible for free lunch, the student-teacher ratio, the percentage of students who are white, the percentage of revenue coming from the federal government, enrollment, median income, and per pupil spending. The only slightly confusing indicator used in the analysis is the percentage of empty seats in a district. We wanted to find an appropriate measure for the amount of student capacity being used in each school district. Our variable measures the enrollment of any given year in a district against the highest enrollment in the district in

[5] Currently, we only have the number of adjacent charter schools variable for Colorado. For Minnesota, we rely on the variable measuring the number of adjacent charter districts. In future work we hope to add this variable to our analysis of the open enrollment situation in Minnesota.

the past 10 years. We then took that difference and made it into a percentage of the maximum enrollment creating a variable measuring the amount of unused school space.[6]

We use the variables described above in two sets of analyses. The first set, which we refer to as the "macro" analysis, examines the factors that predict two open enrollment-related phenomena: the total number of students entering a district through open enrollment, and the total number of students exiting a district through open enrollment.

The second set of analyses, which we refer to as the "micro" analysis, makes use of the detailed open enrollment records maintained by Colorado and Minnesota and examines the factors that predict each district-level transaction. In these micro analyses we specify two separate models: the first models the number of students entering a district and a second models the number of students leaving a district from other districts. The micro analysis is explained in greater detail in a later section of this paper.

V Macro Analysis

As noted above, in the macro analysis we model two open enrollment-related phenomena for each state. First, we model the aggregate number of students coming into a district through open enrollment, with no attention paid to their district of origin. Second, we model the aggregate number of students exiting a district through open enrollment. We estimate these models using simple OLS regression with robust standard

[6] School capacity is in general very difficult to measure. Because of the ever-changing nature of school facility usage, a specific count of student capacity will often not be available. Capacity is a function of buildings and class size. Schools will say they are full one year only to let in more students the next to cope with a large incoming class. We feel that our measure is a reliable indicator for our purposes and utilizes the data available. Our variable will measure "0" in some districts in years where their peak 10-year enrollment is in that particular year.

errors. Similar sets of independent variables are used in each of our models. Specifically, we include district measures of test scores,[7] enrollment, charter school presence, capacity, per pupil spending, and a number of socioeconomic characteristics of the district, such as the percent of students eligible for free lunch, the percent of students who are white, and the median income of families residing in the district. The following tables summarize the relevant variables for both states we analyze.

[Insert tables 1 and 2 here]

The results of the macro analysis are relatively consistent across the two states we analyze and largely conform to the hypotheses presented above. We first present and discuss the results of our macro analysis of Colorado. We begin by discussing our model of the aggregate number of students coming into a district before moving on to analyzing the aggregate number of students exiting a district through open enrollment.

Colorado In. The results in Table 3 show that our model explains approximately 80 percent of the variation in the number of students entering a district through open enrollment, with nearly all of the variables behaving in accordance with our expectations. In all models we first control for district size, which is always positive and significant because we are modeling the count of students going into and out of a district. This allows for meaningful interpretation of the other variables affecting these counts.

The number of charter schools in a district was found to be a positive predictor of the number of students entering a district. On the other hand, the percent of students

[7] Our test score measure is a district average across grades and test subjects. We also tried models using test averages for individual grades, but the collinearity routinely rendered them insignificant.

eligible for free lunch, the percent of students who are white, and median income were found to be significant negative predictors of the number of students entering a district through open enrollment. The sign on the median income and percent white coefficients may seem somewhat counterintuitive; one may expect students to open enroll into richer districts. One possible explanation for this finding is that wealthy districts hope to maintain their exclusivity and are finding ways to prevent students from open enrolling into them. Additionally, the fact that the variable measuring the number of adjacent charter schools exhibits a positive, statistically significant coefficient may be surprising. However, our previous research leads us to believe that this finding is indicative of the presence of "choice nodes," which are areas of the state (most likely urban and suburban areas) where choice programs are used frequently. Finally, our results indicate that test scores may be positively associated with the number of students open enrolling into a district, but the result does not reach statistical significance.

We specified a number of other models in an effort to assess the robustness of our results. First, we ran a model that excluded the test score variable from the model because there are roughly 30 districts that, because of their small size, are not required to report test scores. Second, we specified another model that excluded potential outlier districts, such as Denver, in order to ensure that these outliers were not driving our finding. The results of all these models, which are available from the authors, are substantively similar to those presented below.

[Insert table 3 here]

Colorado Out. While still explaining a large portion of the variance, our model of the number of students exiting a district through open enrollment did not contain as many significant predictors. In Table 4 only test scores, the percentage of students who are white, the number of adjacent charter schools, and enrollment were found to be predictive of the number of students leaving a district through open enrollment. To contextualize our findings, a ten percentage point increase in students testing at either the advanced or proficient level in a district is associated with approximately 26 fewer students open enrolling out of the district. This represents a significant performance effect. Furthermore, we again see evidence of exclusivity as a ten percentage point increase in the percent of white students in a district is associated with over 30 fewer students open enrolling out of the district.

The presence of adjacent charter schools appears to lure students out of a district. Each additional charter school in an adjacent district is associated with approximately 12 additional students open enrolling out of a district. For districts surrounded by a large number of charter schools, this represents a significant effect.

[Insert table 4 here]

Minnesota

Minnesota In. Our model of the aggregate number of students coming into a district through open enrollment in Minnesota has both similarities and differences with the analogous model for Colorado. As indicated in Table 5, enrollment is again a significant positive predictor of the number of students open enrolling into a district. The

effect of enrollment in Minnesota is about half as large as it was for Colorado, however. Specifically, in Minnesota, an increase in enrollment of 10,000 students is associated with an additional 109 students open enrolling into a district.

Test scores are found to be a positive and significant predictor of the number of students open enrolling into a district in Minnesota.[8] A one standard deviation increase in test scores is predictive of an additional 16 students open enrolling into a district. Furthermore, whereas in Colorado both higher median income and the more students eligible for free lunch were found to be negatively associated with the number of students open enrolling into a district, in Minnesota they are found to be significant *positive* predictors of incoming open enrollment flows. It could be that wealthy districts in Minnesota, due to the nature of the open enrollment law or some other factor, have not been able to maintain their exclusivity as successfully as have wealthy districts in Colorado. With respect to the finding on the percent of students eligible for free lunch, it is possible that low-income students choosing to open enroll do not choose to attend the wealthiest districts where they may feel out of place.

Readers may be surprised that the number of charter schools in a district does not significantly predict the number of students entering a district through open enrollment, but the number of adjacent charter districts does. This finding is an artifact of the Minnesota charter school authorization law. In Minnesota, charter schools are considered to be independent school districts.[9] As a result, their presence should not be expected to

[8] Although the coefficient on test scores was also positive in Colorado, it was not statistically significant.
[9] This legal setup is quite unique. In most other states, including Colorado, charter schools operate as instrumentalities of a school district. As a result of charter schools' unique legal situation in Minnesota, our coding structure differs between the two states in our analysis. In Colorado, the number of charter schools variable measures the number of charter schools that are instrumentalities of that district. In Minnesota, the number of charter schools variable measures the number of charter schools that are located inside a district's geographic boundaries.

increase the number of students open enrolling into the school district in which they are geographically located. However, as was the case in Colorado, we believe that the positive coefficient on the number of adjacent charter districts is likely indicative of the presence of "choice nodes."

Finally, our capacity measure is a significant negative predictor of incoming open enrollment flows. As discussed in the theory section, it is unclear if excess capacity will lead to higher or lower inflows of students. This result seems to indicate that districts with excess capacity are undesirable from a family's point of view, resulting in lower open enrollment flows.

[Insert table 5 here]

Minnesota Out. Our model of the number of students exiting a district through open enrollment (Table 6) succeeds in explaining over 90 percent of the variation in the dependent variable. The variables found to be significant predictors of open enrollment outflows include test scores, the percentage of students eligible for free lunch, the number of charter schools in a district, the number of adjacent charter schools, and enrollment. The positive sign on the number of charter schools in a district may seem counterintuitive, but there is a simple explanation. As noted earlier, charter schools operate as independent school districts in Minnesota (see footnote 10). These schools locate disproportionately in poor performing districts and students attending these schools are classified as open enrolling out of another district. As a result, because charter schools are classified as independent school districts, districts with many charter schools

within their borders are more likely to experience greater open enrollment outflows, ceteris paribus. The presence of charter schools in adjacent districts, a variable also found to be significant, simply exacerbates this effect.

The coefficient on the test score variable indicates that a one standard deviation decrease in a district's average scale score is associated with approximately 11 fewer students open enrolling out of a district. Furthermore, our results indicate that districts with larger percentages of students eligible for free lunch exhibit open enrollment losses. A ten percentage point increase in students eligible for free lunch in a district is predictive of an additional 28 students open enrolling out of a district.

[Insert table 6 here]

VI "Micro" Analysis

As noted in an earlier section of this paper, both Minnesota and Colorado maintain detailed records of open enrollment flows between school districts. The analyses presented in this section take advantage of these detailed records to model each district-level transaction for both the number of students entering and leaving a district through open enrollment. The modeling procedure can best be explained using the inset below. The inset illustrates that the Bennett district receives students from seven separate districts. In the macro analysis, we modeled the aggregate number of students coming into Bennett, but in the micro analysis we model each "transaction" between Bennett and the seven separate sending districts. The dependent variable in our inflow model is the number of students coming into a receiving district from each sending district. We

perform an analogous outflow analysis where we model the transactions between a sending district and each of its receiving districts.

Receiving District	Sending district	Number of students
BENNETT 29J	ADAMS COUNTY 14	3
BENNETT 29J	BRIGHTON 27J	3
BENNETT 29J	STRASBURG 31J	6
BENNETT 29J	ADAMS-ARAPAHOE 28J	10
BENNETT 29J	BYERS 32J	11
BENNETT 29J	BOULDER VALLEY RE 2	1
BENNETT 29J	DENVER COUNTY 1	15

The specifications of our micro models are based upon our macro models, with one important addition. Specifically, in addition to including variables measuring the characteristics of the receiving (or sending, depending upon whether we are modeling inflows or outflows) districts, we include the difference in characteristics between the two districts involved in a transaction. In the case of our open enrollment inflow model, the difference in district characteristics is calculated as the characteristics of the receiving district minus the characteristics of the sending districts. For our outflow models, the difference is calculated as the characteristics of the sending district minus the characteristics of the receiving district. We refer to the variables measuring the characteristics of the receiving or sending districts as “level variables” while the variables measuring the difference in characteristics between the sending and receiving districts are creatively referred to as “difference variables”.

We estimate all of these models using generalized least squares with random effects controls to account for the fact that transactions grouped within a district are likely to have correlated error terms. In addition, we again estimate robust standard errors to correct for heteroskedasticity.

Colorado

Colorado In. Our inflow model for Colorado (Table 7) reveals a number of interesting results. First, it is clear that our model of micro-level inflows does not have as much explanatory power as our model of macro-level inflows. Additionally, results illustrate that our model is more successful at explaining the between-district variation, as opposed to the within-district variation.

Looking at the level variables, we see that test scores, the percentage of students who are white, and enrollment are significant predictors of the number of students flowing into a district. These variables perform similarly to what we saw in the macro analysis. Specifically, higher test scores and larger enrollments are associated with a greater open enrollment inflow. The negative coefficient on the percentage of white students coupled with the positive (and marginally significant) coefficient for median income provides even further evidence of an exclusivity effect.

The difference variables provide interesting results on a number of fronts. First, controlling for the level of test scores in the receiving district, the difference in test scores between the receiving and sending district is not a significant predictor of open enrollment inflows. The difference in percent of white students, however, is significant. This indicates that, when it is possible, families will opt to attend higher socioeconomic status districts. This finding is further supported by the direction of the coefficients on test score differences and median income differences, even though they fail to reach statistical significance. Finally, we find that, controlling for enrollment levels of receiving districts, larger enrollment differences between receiving and sending districts

are associated with lower open enrollment inflows. This finding indicates that, all else equal, students choose to open enroll into relatively smaller districts.

[Insert table 7 here]

Colorado Out. The micro-level outflow model we specified is quite successful at explaining the between-district variation in the number of students open enrolling out of a district, but again struggles to explain much of the intra-district variation. In this model, we also see large performance effects for both the level and difference variables. As expected, greater test score differences between the sending and receiving districts is associated with smaller open enrollment outflows. Furthermore, the results indicate that greater outflows are associated with the sending district having a greater percentage of students eligible for free lunch than the receiving district. In Colorado then, the story seems to be the fact that test scores appear to play a significant role in open enrollment decisions.

[Insert table 8 here]

Minnesota

Minnesota In. The results for our micro-level model of open enrollment inflows in Minnesota (Table 9) mirror many of the results seen in Colorado. Specifically, we see positive and significant coefficients on the test score and enrollment level variables.

Furthermore, the enrollment difference variable exhibits a negative sign. In contrast to Colorado, the test score difference variable is not significant and the free lunch and percent white variables are significant with a negative coefficient. Finally, we see further evidence for the existence of "choice nodes" with the significant and positive coefficient on the number of adjacent charter school level variable.

[Insert table 9 here]

Minnesota Out. Our final model, which predicts the micro-level open enrollment outflows in Minnesota (Table 10) also exhibits many of the same trends as its analogous Colorado model. Specifically, we again see a positive and significant coefficient on the test score level variable coupled with a negative and significant parameter estimate for the test score difference variable. Only one other level variable in the model reaches statistical significance, the percentage of white students in the district. The results indicate that a greater percentage of white students are associated with smaller open enrollment outflows. In contrast, several difference variables are significant. In addition to test scores, these include percent white, number of adjacent charter districts, enrollment, and empty seat percentage.

[Insert table 10 here]

VII Conclusions and Policy Implications

The preceding analysis is complex and involves two states with quite different open enrollment arrangements. However, there are several results that are consistent between the states and across our analyses. The first is that district average achievement is almost always a predictor of open enrollment flows. *Districts with higher achievement attract students and districts with lower achievement lose students.* This generally held for both states and was significant when we analyzed either the level of the test scores or the precise differences between districts using our gold standard, transactional model.

The policy implications of this finding cut in two directions. If such transfers become very large, as they are in some of the metropolitan areas, open enrollment will cause further segregation in terms of achievement levels between districts. On the other hand, they also allow families further choices and an easier route to a more successful school system than was required when families had to move their residence to gain admission to a higher achieving school district.

The effect of socio-economic status on enrollment flows was unclear and varied. In Colorado there was evidence that more well-off, whiter districts, probably suburbs, were restricting flows from poorer and more minority districts. But that was not the case in all the analyses, or in Minnesota. In Minnesota, for example, districts with a large percentage of their students eligible for free lunch both sent and received more students after controlling for district size. Although we are not absolutely certain, and our measure of excess capacity may be problematic, it appears that open enrollment is unlikely to aid districts with open seats, and it may aggravate the problem. Families appear to be choosing to move students away from districts with excess capacity and the losing districts seem unable to stop this outflow.

The role of charter schools, although complicated in Minnesota is generally as predicted and in line with earlier studies. However, this study provides some evidence that the decision by Minnesota policymakers to structure their charter school authorization law in a manner that designates each charter school as an independent school district may have some unintended consequences. Specifically, because charter schools are independent school districts, students choosing to attend them must open enroll into them. As noted earlier, charter schools generally locate in poor performing, struggling districts. As a result, these poor performing, struggling districts lose substantial amounts of state aid because of students open enrolling into charter schools. As an example, over 7,500 students open enrolled out of the Minneapolis School District in 2003-04. This represents 17 percent of total enrollment. A significant portion of these students open enrolled into charter schools. The loss of state aid associated with this loss of students can make it more difficult for these struggling districts to obtain the resources necessary to improve performance. Finally, our results provide evidence that the presence of a number of charter schools in adjacent districts leads to higher flows of students in both directions. We believe this is because a choice climate is created when there are nodes of districts all experimenting with charter schools. Open enrollment becomes one more choice mechanism for parents generally conditioned to educational choice.

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Table 1. Summary statistics for relevant variables- Minnesota

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Number of students open enrolling- In	344	140.58	189.285	1	2026
Number of students open enrolling- Out	334	200.48	549.307	0	7552
Net flow of students	344	-59.89	486.899	-6359	2026
Mean scale score- District	318	1243.12	36.837	1021.5	1360.7
Percent of students free-lunch eligible	345	20.90	12.526	0	94.8
Student-teacher ratio	344	14.53	2.769	1.9	20.5
Percent of students who are white	345	90.36	14.041	0	100
Percent of revenue from federal sources	340	5.88	4.984	0.9	43.4
Charter school in district	345	0.09	0.286	0	1
Number of charter schools in district	345	0.22	1.467	0	21
Adjacent charter district	345	0.42	0.494	0	1
Number of adjacent charter districts	178	1.41	1.610	0	8
Empty seat percentage	340	11.98	10.606	0	71.2
Median income of district	338	48776.57	11594.560	15000	96855
Enrollment of district	345	2349.38	4878.707	6	46037
Per pupil spending	340	7720.56	1511.816	5971	21098

Table 2. Summary statistics for relevant variables- Colorado

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Number of students open enrolling- In	178	197.04	478.708	0	3402
Number of students open enrolling- Out	178	197.02	473.083	0	4394
Net flow of students	178	0.02	295.179	-1365	1336
Percent of students advanced or proficient – District average	153	50.71	12.334	18.2	80.5
Percent of students free-lunch eligible	178	25.63	14.035	0	70.3
Student-teacher ratio	178	15.06	21.665	5.6	299.1
Percent of students who are white	178	74.90	20.521	5.6	98.7
Percent of revenue from federal sources	178	5.45	4.594	0.3	31.2
Charter school in district	178	0.23	0.422	0	1
Number of charter schools in district	178	0.52	1.538	0	14
Adjacent charter district	178	0.59	0.493	0	1
Number of adjacent charter districts	178	1.41	1.610	0	8
Number of adjacent charter schools	178	3.77	6.249	0	30
Empty seat percentage	178	7.66	9.599	0	40
Median income of district	174	45196.98	12714.270	23125	90124
Enrollment of district	178	4219.38	10985.980	59	87925
Per pupil spending	178	8160.30	2106.957	4658	15627

Table 3. OLS results for number of students open enrolling *into* a district-Colorado: 2003-04

Variable	Coefficient	Standard Error	P-value
Average District - Advanced + Proficient	1.148	2.307	0.620
Percent Free Lunch	-8.336	4.424	0.062
Percent White	-4.545	1.646	0.007
Number of Charters	67.786	26.260	0.011
Number of Adjacent Charter Schools	18.240	8.759	0.039
Empty Seat Percentage	-2.465	1.861	0.187
Median Income	-0.008	0.004	0.073
Enrollment	0.024	0.005	0.000
Per Pupil Spending	0.014	0.013	0.277
Constant	738.725	459.119	0.110

N = 151
R-squared = 0.7965

Table 4. OLS results for number of students open enrolling *out* of a district-Colorado: 2003-04

Variable	Coefficient	Standard Error	P-value
District Average - Advanced + Proficient	-2.647	1.552	0.090
Percent Free Lunch	0.276	2.310	0.905
Percent White	-3.217	1.406	0.024
Number of Charters	21.075	58.318	0.718
Number of Adjacent Charter Schools	11.894	4.206	0.005
Empty Seat Percentage	-2.000	1.705	0.243
Median Income	-0.001	0.003	0.628
Enrollment	0.030	0.007	0.000
Per Pupil Spending	0.002	0.010	0.836
Constant	432.481	183.654	0.020

N = 151
R-squared = 0.7878

Table 5. OLS results for number of students open enrolling *into* a district-Minnesota: 2003-04

Variable	Coefficient	Standard Error	P-value
District Average – Scale score	0.443	0.146	0.003
Percent Free Lunch	2.240	1.213	0.066
Percent White	-0.572	0.925	0.537
Number of Charters	1.373	14.393	0.924
Number of Adjacent Charter Districts	33.671	10.939	0.002
Empty Seat Percentage	-3.272	0.753	0.000
Median Income	0.005	0.002	0.008
Enrollment	0.011	0.006	0.086
Per Pupil Spending	0.019	0.013	0.159
Constant	-797.772	283.346	0.005

N = 315
R-squared = 0.5535

Table 6. OLS results for number of students open enrolling *out* of a district-Minnesota: 2003-04

Variable	Coefficient	Standard Error	P-value
District Average – Scale score	-0.309	0.172	0.074
Percent Free Lunch	2.852	1.394	0.042
Percent White	-0.288	0.928	0.757
Number of Charters	209.785	43.694	0.000
Number of Adjacent Charter Districts	68.091	24.244	0.005
Empty Seat Percentage	0.816	0.814	0.317
Median Income	0.001	0.002	0.577
Enrollment	0.045	0.009	0.000
Per Pupil Spending	0.008	0.009	0.370
Constant	226.194	270.218	0.403

N = 315
R-squared = 0.9054

Table 7. Gold Standard results for number of students open enrolling *into* a district-Colorado: 2003-04

Variable	Coefficient	Standard Error	P-value
Level Variables			
District Average Test Scores	0.931	0.355	0.009
Percent Free Lunch	-0.632	0.446	0.156
Percent White	-0.691	0.328	0.035
Number of Charters	3.161	6.653	0.635
Number of Adjacent Charter Schools	0.464	0.749	0.536
Median Income	-0.001	0.0004	0.115
Enrollment	0.002	0.001	0.049
Per Pupil Spending	0.005	0.003	0.104
Empty Seat Percentage	-0.562	0.485	0.247
Difference Variables- "Receiving" – "Sending"			
District Average Test Scores Difference	0.161	0.236	0.496
Percent Free Lunch Difference	0.087	0.393	0.824
Percent White Difference	0.457	0.170	0.007
Number of Charters Difference	1.387	3.921	0.724
Number of Adjacent Charters Difference	-0.622	0.391	0.112
Median Income Difference	0.0002	0.0004	0.583
Enrollment Difference	-0.0015	0.0006	0.011
Per Pupil Spending Difference	0.0004	0.0014	0.786
Empty Seat Percentage Difference	0.237	0.296	0.425
Constant	23.337	40.615	0.566

Number of Observations = 1110	Observations
Number of Groups = 139	Per Group
R-squared within = 0.0929	Min = 1
R-squared between = 0.2278	Avg = 8.0
R-squared overall = 0.1553	Max = 93

Table 8. Gold Standard results for number of students open enrolling *out* of a district-Colorado: 2003-04

Variable	Coefficient	Standard Error	P-value
Level Variables			
District Average Test Scores	0.940	0.352	0.008
Percent Free Lunch	-0.627	0.446	0.159
Percent White	-0.692	0.327	0.035
Number of Charters	3.191	6.649	0.631
Number of Adjacent Charter Schools	0.500	0.749	0.504
Median Income	-0.001	0.0004	0.118
Enrollment	0.002	0.0009	0.049
Per Pupil Spending	0.004	0.003	0.117
Empty Seat Percentage	-0.532	0.484	0.272
Difference Variables- "Sending" – "Receiving"			
District Average Test Scores Difference	-1.104	0.239	0.000
Percent Free Lunch Difference	0.539	0.281	0.055
Percent White Difference	0.235	0.255	0.357
Number of Charters Difference	-4.607	4.384	0.293
Number of Adjacent Charters Difference	0.117	0.624	0.851
Median Income Difference	0.0004	0.0003	0.165
Enrollment Difference	-0.0002	0.0005	0.697
Per Pupil Spending Difference	-0.0047	0.0024	0.052
Empty Seat Percentage Difference	0.297	0.402	0.460
Constant	23.611	40.563	0.561

Number of Observations = 1110	Observations
Number of Groups = 149	Per Group
R-squared within = 0.0576	Min = 1
R-squared between = 0.6868	Avg = 7.4
R-squared overall = 0.1555	Max = 23

Table 9. Gold Standard number of students open enrolling *into* a district-Minnesota: 2003-04

Variable	Coefficient	Standard Error	P-value
Level Variables			
District Average Test Scores	0.039	0.021	0.061
Percent Free Lunch	0.241	0.129	0.061
Percent White	0.002	0.102	0.983
Number of Charters	0.535	0.586	0.361
Number of Adjacent Charter Schools	2.246	1.193	0.060
Median Income	0.0001	0.0001	0.259
Enrollment	0.0001	0.0002	0.634
Per Pupil Spending	0.0000	0.0011	0.993
Empty Seat Percentage	-0.075	0.093	0.419
Difference Variables- "Receiving" – "Sending"			
District Average Test Scores Difference	-0.007	0.017	0.661
Percent Free Lunch Difference	-0.215	0.105	0.040
Percent White Difference	-0.117	0.064	0.067
Number of Charters Difference	0.052	0.499	0.917
Number of Adjacent Charters Difference	-0.953	0.816	0.242
Median Income Difference	0.0001	0.0001	0.214
Enrollment Difference	-0.0004	0.0001	0.005
Per Pupil Spending Difference	-0.0009	0.0008	0.263
Empty Seat Percentage Difference	-0.146	0.066	0.026
Constant	-48.826	29.568	0.099

Number of Observations = 3328	Observations
Number of Groups = 315	Per Group
R-squared within = 0.0266	Min = 1
R-squared between = 0.0459	Avg = 10.6
R-squared overall = 0.0352	Max = 78

Table 10. Gold Standard results for number of students open enrolling *out* of a district-Minnesota: 2003-04

Variable	Coefficient	Standard Error	P-value
Level Variables			
District Average Test Scores	0.070	0.022	0.001
Percent Free Lunch	0.213	0.161	0.186
Percent White	-0.180	0.103	0.083
Number of Charters	0.226	0.569	0.691
Number of Adjacent Charter Schools	1.526	1.116	0.172
Median Income	0.0001	0.0001	0.400
Enrollment	0.0002	0.0002	0.309
Per Pupil Spending	-0.0009	0.0011	0.433
Empty Seat Percentage	-0.008	0.1020	0.935
Difference Variables- "Sending" – "Receiving"			
District Average Test Scores Difference	-0.041	0.013	0.002
Percent Free Lunch Difference	0.162	0.128	0.207
Percent White Difference	0.259	0.092	0.005
Number of Charters Difference	-0.317	0.331	0.338
Number of Adjacent Charters Difference	-1.200	0.694	0.084
Median Income Difference	-0.0001	0.0001	0.347
Enrollment Difference	0.0002	0.0001	0.016
Per Pupil Spending Difference	0.0008	0.0008	0.331
Empty Seat Percentage Difference	0.155	0.072	0.030
Constant	-63.811	30.403	0.036

Number of Observations = 3305	Observations
Number of Groups = 207	Per Group
R-squared within = 0.0176	Min = 1
R-squared between = 0.1135	Avg = 16
R-squared overall = 0.0469	Max = 168