Dynamic Participation in Interdistrict Open Enrollment

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Abstract: Interdistrict open enrollment is the nation's largest and most widespread school choice program, but our knowledge of the operations and effects of these programs is limited. Drawing on five years of student-level data from the universe of public school attendees in Colorado, we perform a three-stage analysis to examine the dynamics of student participation in the state's interdistrict open enrollment program. First, we explore the characteristics of students who open enroll in a defined baseline year. Second, we analyze the characteristics of students who—conditional on open enrolling in the defined baseline year—continue to participate in the program in subsequent years. Finally, we examine the characteristics of students who—conditional on not open enrolling in the defined baseline year—choose to participate in the program in one or more subsequent years. Our analyses demonstrate that interdistrict open enrollment is not primarily used by low-income, at-risk students, but rather by more socioeconomically advantaged students. The results also reveal substantial instability in participation among low-income and minority students. We discuss the implications for research and policy

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Introduction

The expansion of school choice represents one of the dominant trends in education policy over the past two decades. A major component of this expansion is the growth of interdistrict open enrollment policies, which allow students to attend public schools located in districts other than the one in which they reside. These policies were almost nonexistent only 25 years ago, but today interdistrict open enrollment programs exist in over 40 states and they currently serve more students than any of the more visible choice policies, including school vouchers (Howell 2004; Campbell, West, and Peterson 2005; Figlio, Hart, and Metzger 2010; Cowen 2010; Witte 2000; Paul, Leegan, and Metcalf 2007; Chakrabarti 2011; Lankford and Wyckoff 2001), magnet schools, and even charter schools (Weiher and Tedin 2002; Buckley and Schneider 2007). Despite the broad scope of interdistrict open enrollment, research into the operations and effects of these programs is limited. Relative to other school choice programs, we know little about the characteristics of interdistrict open enrollment participants, the schooling decisions that students make through the program, or the effects of the program on outcomes of interest. By analyzing student participation in interdistrict open enrollment, this paper attempts to gain insight into a basic, yet important, dimension of the nation's largest school choice program.

Drawing on five years of student-level data—2005-06 to 2009-10—from the universe of students attending public schools in Colorado, we perform a three-stage analysis to examine the dynamics of student participation in the state's interdistrict open enrollment program. First, using three grade cohorts from the 2006-07 school year—kindergarteners, 6^{th} graders, and 9^{th} graders—we explore the characteristics of students who open enroll in that defined baseline year. Second, for each of the three cohorts listed above, we analyze the characteristics of students who—conditional on open enrolling in the baseline year of 2006-07—continue to participate in the program in subsequent years. Finally, we examine the characteristics of students who—

conditional on not open enrolling in the baseline year of 2006-07—choose to participate in the program in one or more subsequent years. Put differently, we address three main questions: Who open enrolls initially? Who keeps open enrolling? And who does not open enroll initially, but participates in the program in later years?

The results of these analyses provide significant insight into a variety of important issues. For example, our analyses demonstrate that interdistrict open enrollment is not primarily used by low-income, at-risk students—often cited as the intended beneficiaries of these programs—but rather by more socioeconomically advantaged students. However, there is little indication of differences in open enrollment participation by academic ability or race/ethnicity. Such findings have important implications for policy debates on issues such as educational stratification. Similarly, in demonstrating differences in open enrollment participation patterns over time and across grade levels, our results inform questions related to whether families view interdistrict open enrollment as a short-term educational solution—perhaps until they can physically relocate to a more desirable district—or as a long-term fix to a problem of limited educational options. Taken together, the analyses and comparisons presented in this paper provide important information into the operations and effects of an oft-overlooked, yet quite important, school choice policy.

Interdistrict Open Enrollment: Background and Context

There are two primary types of formal interdistrict open enrollment policies—voluntary and mandatory. Under voluntary policies, school districts are free to decide whether to accept transfers from other districts. Mandatory policies, on the other hand, require school districts to accept transfers from other districts, although state laws generally specify a set of conditions

under which districts can legally refuse to accept transfers. Both voluntary and mandatory policies generally prohibit districts from restricting student transfers out of the district.

Like other school choice policies, interdistrict open enrollment programs are a relatively recent addition to the educational landscape. Voluntary programs only began to emerge as a schooling option in the early 1980s and the first mandatory statewide program did not exist until the implementation of Minnesota's policy in 1991 (Boyd, Hare, and Nathan 2002). Since enactment of that program, however, interdistrict open enrollment has expanded rapidly and by 2011 only eight states and the District of Columbia were without some form of the policy (National Center for Education Statistics 2012).[1] Table 1 presents the number of states with voluntary and mandatory interdistrict open enrollment policies.[2]

[Insert Table 1 about here]

Because the empirical analyses to follow draw on data from the mandatory interdistrict open enrollment program in Colorado, we discuss this class of policy—both generally and in the specific context of Colorado—in further detail. The specifics of mandatory interdistrict open enrollment policies clearly vary across states, but there are three features that nearly all programs possess. First, and most basically, the policies create a process through which students can attend public schools located in a district other than the one in which they resided. Historically, public school students have been required—with few exceptions—to attend the school specified by their district of residence. Second, open enrollment policies generally specify a set of conditions under which school districts can refuse to accept interdistrict transfers. The list of

[1] The eight states without some form of interdistrict open enrollment in 2011 were Alabama, Alaska, Hawaii, Illinois, Maryland, North Carolina, Virginia, and Wyoming. It is important to note that Hawaii possesses only a single school district, rendering interdistrict open enrollment impossible.

[2] Table 1 makes clear that six states have both voluntary and mandatory interdistrict open enrollment policies. In most of these cases, the mandatory policies require districts to accept transfers with a specific characteristic (e.g. low test scores, a learning disability, etc.) while acceptance of students without the specified characteristic(s) is voluntary.

allowable conditions for transfer refusal is uniquely determined by each state's policy, but two of the most common conditions on these lists include a lack of capacity in the district and an applicant's history of behavioral problems, such as suspensions, expulsions, or substance abuse. Third, interdistrict transfer programs are generally designed in a manner such that state education aid associated with a transferring student is disbursed to the district of attendance, rather than the district of residence. The precise amount of funding a district receives for each interdistrict transfer it accepts is state-specific in nature, but Reback (2008) notes that the amount is generally greater than the marginal cost of educating an additional student.

Along with these three foundational features of interdistrict open enrollment policy, two additional dimensions of the transfer programs—transportation and desegregation policies—warrant discussion. A major challenge in implementing open enrollment policies involves transporting students to schools located outside of their district of residence. In response to this challenge, a number of states place all transportation responsibilities upon the parents of transferring students while another set of states mandate that the district of residence provide all necessary transportation. A third group of states does not address the issue of transportation at all in their open enrollment policies, thus leaving the issue to be sorted out by parents, the district of residence, and the district of attendance. In addition to variance in the responsibility for providing transportation, state policies also differ in the amount of funding provided to support the transportation of interdistrict transfers. Policies range from providing no transportation funding at all to fully reimbursing districts for the costs associated with busing interdistrict transfers.[3]

[3] The Education Commission of the States maintains a database that describes several features of each state's interdistrict open enrollment policy. The database can be found at: http://ecs.force.com/mbdata/mbtab4ne?sid=a0i70000000Xk5v&rep=OET

Finally, interdistrict transfer policies in a significant number of states explicitly permit districts to refuse transfers—both into and out of the district—if the transfer would violate the provisions of an established desegregation policy or otherwise upset the racial or socioeconomic balance of the district. The legality of such provisions, however, is in doubt after the recent U.S. Supreme Court decisions in *Parents Involved in Community Schools Inc. v. Seattle School District* and *Meredith v. Jefferson County (Ky.) Board of Education*, which prohibited schools and districts from considering race in school admissions processes.

Interdistrict Open Enrollment in Colorado

The Public Schools of Choice Act of 1990 serves as the authorizing legislation for Colorado's mandatory statewide interdistrict open enrollment program. Beginning with the 1994-95 school year, this legislation allowed students to attend any public schools located outside their district of residence without paying tuition to the nonresident district. However, as foreshadowed above, the policy specifies five conditions under which districts can legally refuse to accept a transfer application:

- A lack of space or teaching staff required to serve the student;
- The district or school is not equipped—either physically or with respect to curriculum—to serve the student;
- The student does not meet established eligibility criteria for participation in a requested program;
- Admission of the student would violate the terms of an established desegregation plan;
- The student has been expelled from another district.

Colorado's interdistrict transfer policy contains one more notable provision with respect to student admission. Specifically, the policy states that if the number of transfer applications received by a district exceeds the number of available seats, the district is urged—but not required—to give enrollment priority to applicants with a proficiency level of unsatisfactory in one or more academic subjects who attend a low-performing public school. With respect to

funding, Colorado's policy mirrors most programs nationally by disbursing state aid associated with a transferring student to the district of attendance. Finally, issues of transportation are not addressed in the relevant statutes.

Colorado's interdistrict open enrollment program quickly grew to serve a significant number of students. By the 2000-01 school year—only six years after the inception of the program—over 20,000 students were using the policy to attend a school located outside their district of residence.[4] Over the following decade the program tripled in size and today it serves in excess of 68,000 students. Table 2 presents the number of students attending a school located outside their district of residence. For purposes of comparison it also presents the total K-12 enrollment in public schools in Colorado as well as the number of students enrolled in the state's charter schools. The table indicates that about 3.2 percent of students attended a school located outside their district of residence during 2000-01 school year while approximately 8.1 percent of students did so in the 2011-12 school year. The corresponding numbers for charter school enrollment are 2.9 and 9.1 percent, respectively.

[Insert Table 2 about here]

Existing Literature

Despite the expansive scope of interdistrict open enrollment policies, research into the operations and effects of these programs is limited—both absolutely and relative to the literatures on other school choice policies, such as charter schools and school vouchers. The studies that do exist, however, generally use district-level data to explore the factors affecting interdistrict transfer flows.

[4] Data on the number of students utilizing Colorado's interdistrict open enrollment program are not available prior to the 2000-01 school year.

The earliest studies of interdistrict open enrollment were conducted in the context of voluntary transfer programs in Massachusetts and Ohio (Fossey 1994; Armor and Peiser 1998; Fowler 1996). The studies in Massachusetts used simple mean calculations to compare the characteristics of districts that were net receivers of interdistrict transfers to the characteristics of districts that were net senders (Fossey 1994; Armor and Peiser 1998). Both studies found that net receiving districts were more advantaged than net sending districts on several measures, including median family income, percent of adults with a college degree, achievement scores, dropout rates, and per-pupil expenditures. In Ohio, Fowler (1996) studied a more basic determinant of interdistrict transfer flows—districts' willingness to accept transfers. Specifically, Fowler (1996) surveyed district superintendents in Ohio and asked them about the factors that were relevant to their decision to participate, or not participate, in the state's voluntary transfer program. Superintendents from participating districts cited a desire to increase enrollment—and thus state funding—as the primary factor driving the decision to accept transfer students. Superintendents from nonparticipating districts generally reported that a lack of classroom space was the primary reason for not accepting transfer students.

Recent scholarship on interdistrict open enrollment has used more detailed data structures and more sophisticated econometric techniques to analyze the factors affecting interdistrict transfer flows. Using district-level data from Minnesota on the number of interdistrict transfers into a district—as well as district rejections of transfer applications—during the 1999-2000 school year, Reback (2008) estimates the determinants of demand for interdistrict transfer. He finds that the average level of student achievement in a district is a stronger predictor of transfer demand than a district's socioeconomic composition or its per-pupil spending level. Welsch, Statz, and Skidmore (2010) perform a similar analysis using four years of district-level data from

Wisconsin. Like Reback (2008), the authors observe both the number of transfers into a district as well as the number of transfer applications received by the district. However, they also observe the districts from which the transfers and transfer applications originated, which allows them to examine the characteristics of both the sending and receiving districts.[5] Using a negative binomial regression approach, the authors detect a positive relationship between the number of transfers into a district and the percentage of students who score at the advanced level on the Wisconsin Knowledge and Concepts Exam—the state standardized test. They also found greater number of student transfers into districts with higher levels of per-pupil spending, lower percentages of minority students, lower percentages of students eligible for free lunch, and more extracurricular opportunities. Greater numbers of students transferred out of districts with low property tax rates, low levels of per-pupil spending, and fewer extracurricular opportunities.

Two previous studies have examined the operations of Colorado's interdistrict open enrollment program. Carlson, Lavery, and Witte (2011) use data on the number of interdistrict transfers between each pairwise combination of districts in the state for the 2003-04 school year, a data structure that permits analysis of both the sending and receiving districts. The results demonstrate that larger numbers of students open enroll out of high-achieving districts than out of lower-achieving districts. However, the analysis also indicates that they are open enrolling into even higher achieving districts. In addition, the authors find larger transfer flows into districts with a lower percentage of students eligible for free lunch, but also lower proportions of White students. Not surprisingly, the analysis reveals that distance places a large constraint on transfer flows.[6] Holme and Richards' (2009) used both student- and district-level data on

[5] Reback (2008) did not observe the districts from which transfers, or transfer applications, came. Consequently, he used the characteristics of neighboring districts as a proxy for the characteristics of sending districts.
[6] Carlson, Lavery, and Witte (2011) also conducted an identical analysis using data from Minnesota and the results were substantively similar.

interdistrict transfers in the Denver metropolitan area during the 2006-07 school year to analyze transfer patterns. Based on the results of chi-square tests, the authors conclude that wealthy students are more likely to take advantage of open enrollment than their less affluent peers.[7] However, consistent with results presented in Carlson, Lavery, and Witte (2011), transferring students are found to enroll in even more advantaged contexts.

Taken as a whole, the existing literature provides a fairly consistent, if somewhat small, body of evidence on the determinants of interdistrict open enrollment flows; it is clear that achievement levels, socioeconomic characteristics, and structural district characteristics all affect transfer flows. Through the accumulation of this evidence, previous studies have also hinted at the characteristics of students who transfer under the program. Specifically, the district-level results from Minnesota and Colorado—and to a lesser extent Wisconsin—provide suggestive evidence that open enrollment programs are disproportionately utilized by relatively advantaged and high-achieving students. These tentative conclusions drawn from the district-level analyses are clearly subject to problems of ecological inference, but it is worth noting that they are corroborated by the limited student-level analyses on the topic (Armor and Peiser 1998; Holme and Richards 2009).[8]

[7] These results are consistent with findings presented in Armor and Peiser (1998), which compared the characteristics of individuals who open enrolled out of their district of residence to the characteristics of individuals who remained enrolled in their district of residence. The results demonstrated that transferring students were wealthier, higher-achieving, and more likely to be White than their non-transferring peers.

[8] Further support for such conclusions come from analyses of selection into private schools and other school choice programs, particularly school vouchers. Studies of selection into private schools consistently show that private school attendees are more likely to be White, have better educated parents, and come from a more affluent family (Betts and Fairlie 2001; Figlio and Stone 2001; Long and Toma 1998). Parental education levels have also been found positive predictors of application to a variety of school voucher programs, including those in Milwaukee, New York, and Washington DC (Beales & Wahl, 1995; Witte, 2000; Howell, 2004; Howell & Peterson, 2006; Campbell et al. 2005). Similarly, several studies have demonstrated that—conditional on receiving the offer of a school voucher—students who accept a voucher offer come from households that are relatively advantaged along several dimensions (Cowen 2010; Howell 2004). It is worth noting, however, that the charter school literature provides a much more mixed picture regarding the characteristics of students who select into charter schools. See Cowen and Winters (forthcoming) for a thorough review of that literature.

This paper extends the limited prior work on student participation in interdistrict open enrollment in two primary ways. First, it draws on student-level data from the universe of students attending public schools in Colorado; previous research has only been able to analyze student-level data from a limited geographic region, such as a metropolitan area (Holme and Richard 2009) or a selection of school districts (Armor and Peiser 1998). Second, the analyses in this paper are based on five years of data, which permits the analyses to go beyond assessing interdistrict open enrollment participation at a single point in time and explore possible dynamics in participation. The following section provides a more in-depth description of the data underlying the empirical analyses to follow.

Data

All data used in the following analyses come from records maintained by the Colorado Department of Education (CDE). Beginning with the 2005-06 school year and extending through the 2009-10 school year, the CDE provided us with student-level records containing information on student enrollment, demographics, achievement, and school and district characteristics for the universe of students attending Colorado public schools during this time period.

In addition to a unique student identifier, the enrollment data provided by CDE contain—for each year—measures of the school attended by each student and the district in which it is located.[9] The data also indicate whether a student attended a school located outside of his or her

[9] More specifically, the data contain a record for each school attended by a student during a given school year. The fact that the data contain multiple observations for students who attended more than one school in a given year represents a potential complication for student-level analyses. To address this issue, we implemented the following decision rule. First, for students with test scores, we kept the record containing the school in which the student was tested. This eliminated approximately half of the duplicate records. For the remaining students with multiple records—those without test scores—we kept the record in which the disposition code listing the reason that a student left a school was not applicable; in effect, we kept the student record for the school in which a student finished the year.

district of residence—a measure of open enrollment. For students who open enroll, the data identify the student's district of residence. The data also contain a variety of relevant contextual data for the schools and districts that students attend, such as dropout rates, mobility statistics, disciplinary information, staff data, available postsecondary options, fiscal information, and socioeconomic composition. For students who open enroll, this information is also available for students' district of residence.[10]

The CDE records contain information on standard demographics—age, grade, gender, race/ethnicity—as well as measures of several other characteristics such as gifted and talented status, free or reduced lunch status, disability status, English language learner status, a measure of language proficiency, and students' primary language. The CDE records also contain multiple student test score measures. Specifically, the data contain students' scale scores on the reading and math portions of the Colorado Student Assessment Program (CSAP), which is administered to all students in grades 3-8 and 10 to meet the accountability provisions of the No Child Left Behind Act. To facilitate cross-grade comparisons, we standardized the CSAP scale scores using the statewide mean and standard deviation for the proper year, grade, and subject. Finally, in order to gauge the level of college readiness among high school students and to track trends in performance over time, Colorado administers the ACT to all students enrolled in 11th grade. Consequently, our data contain ACT scores—both composite and subject-specific—for all 11th grade students in Colorado.

Taken as a whole our dataset contains nearly 4.3 million observations from approximately 1.25 million unique students. We have extensive information on each student's demographic and achievement profile, as well as data on the schools that students attend and the

[10] The data do not contain a record of the "school of residence" for open enrolling students. Consequently, we do not possess information about the schools out of which students are open enrolling.

districts in which they reside. In short, our data are well-suited for analyses that will provide significant insight into student participation in interdistrict open enrollment.

Analytical Framework and Results

The empirical analyses address three main topics: 1) The characteristics of students who open enroll in a given year, with an explicit focus on 2006-07, 2) The characteristics of students who—conditional on open enrolling in 2006-07—continue to participate in the program in subsequent years, and 3) The characteristics of students who—conditional on not open enrolling in 2006-07—choose to open enroll in one or more subsequent years.

Bivariate Analysis and Results

As a first step in gaining insight into the characteristics of students who participate in interdistrict open enrollment, Table 3 presents—for each year from 2005-06 to 2009-10—the percentage of students who open enroll by grade, as well as by selected demographic characteristics. For the grade results, two major trends emerge. First, high school students generally open enrolled at higher rates than students in elementary or middle school; this pattern is evident across all five years. Second, open enrollment rates increased across time for all grade levels, but the increases were somewhat larger for high school students than elementary or middle school students.

[Insert Table 3 about here]

The demographic results demonstrate that females are slightly more likely than males to open enroll, but perhaps more interesting are the results by race/ethnicity and free lunch status. In each of the five years of data, Black students open enrolled at higher rates than students of any other race while Hispanic students were least likely to open enroll. In addition, students who are eligible for free lunch are less likely to open enroll than their more affluent peers, an interesting

finding given the original stated intent of open enrollment policies—a topic discussed in greater detail below. The results also demonstrate that students classified as English language learners (ELL) open enroll at lower rates than students who are proficient in English and that students with a disability—either physical or learning—are less likely to open enroll than their nondisabled peers. Open enrollment rates for all demographic groups increased over time.

Table 4 provides information on open enrolling students' districts of residence. On average, students who open enroll reside in districts with a higher percentage of students eligible for free- or reduced-price lunch and a lower percentage of students who are White, relative to students who attend school in their resident district. In addition, the average open enroller resides in a district that is somewhat smaller, offers fewer AP courses, and has slightly higher dropout and truancy rates, relative to the districts in which non-open enrolling students reside. Interestingly, the average reading achievement levels in the resident districts of open enrolling students was somewhat lower than that of non-open enrollers in the first three years of our data, but slightly higher in the final two years. Full results are presented in Table 4.

[Insert Table 4 about here]

Table 5 presents the achievement profile of students who open enroll. With few exceptions, students who open enroll have somewhat lower CSAP math scores than their non-open enrolling peers, but higher CSAP reading scores. In general, the magnitude of the reading advantage is larger than the size of the negative difference in math. This interesting pattern is further explored in subsequent analyses. As noted earlier, the ACT is administered to all 11^{th} grade students in Colorado. Table 4 illustrates that 11^{th} graders who open enroll have slightly lower ACT scores than students who attend school in their district of residence.

[Insert Table 5 about here]

The results presented in Table 6 take advantage of the panel nature of the dataset to calculate students' interdistrict open enrollment transition probabilities. That is, the table presents the percentage of students who—conditional on their open enrollment status at time *t*—open enroll at time *t+1*. The results demonstrate a lack of stability in interdistrict open enrollment participation. Among the full sample, only about 70 percent of students who open enroll in one year also open enroll the next year. In contrast, nearly 98 percent of students who do not open enroll in a given year also do not attend a school located outside of their district of residence the following year. There is significant variation in transition probabilities across demographic groups. For example, about 75 percent of White and Asian students open enroll in two consecutive years, but the corresponding number for Black students is only 62 percent. Students eligible for free lunch are similarly (un)likely to open enroll in two consecutive years—about 65 percent do so—while about 75 percent of students not eligible for free lunch do so. Finally, although Table 5 demonstrated that students classified as gifted and talented were relatively unlikely to open enroll, the results in Table 6 indicate that those who choose to participate in the program are quite stable in their participation. Taken together, the results presented in Tables 4-6 suggest a number of interesting trends in interdistrict open enrollment participation, which we explore further in a multivariate framework below.

[Insert Table 6 about here]

Multivariate Analysis

To gain further insight into the characteristics of interdistrict open enrollment participants—and the dynamics of their participation—we estimate a series of three models. The first model simply predicts interdistrict open enrollment participation during the 2006-07 school year as a function of student characteristics as well as the characteristics of a student's district of residence and can be written as:

$$\Pr(O_{id2006} = 1) = logit^{-1}(\boldsymbol{\gamma F_i} + \boldsymbol{\delta S_{i2005}} + \boldsymbol{\theta D_{d2005}}) \quad (1)$$

where the probability that student *i* residing in district *d* open enrolls in 2006-07 is a function of a vector of fixed student characteristics ***F***, a vector of time-varying student and family background characteristics ***S***, and a vector of characteristics of the student's district of residence ***D***; $logit^{-1}$ (x) = $e^x/(1+e^x)$. Included in the vector of fixed student characteristics are measures of students' race/ethnicity and sex. Eligibility for free- or reduced-price lunch, gifted and talented status, English language proficiency, disability status, and test scores on the reading and math portions of the CSAP are included in the vector of time-varying student and family background characteristics. The vector of district characteristics contains measures of enrollment, a district's adequate yearly progress (AYP) status, the mean level of reading achievement, the number of AP courses offered, the dropout rate, the student-teacher ratio, the truancy rate, the percent of students who are white, and the percent of students eligible for free- or reduced-price lunch. Our measures of time-varying student and district characteristics are lagged by one year to account for the fact that, for a given year, students must make the decision to open enroll during the previous year. We estimate this model for three separate grade cohorts in 2006-07—kindergarteners, 6th graders, and 9th graders—to assess whether the predictors of participation in interdistrict open enrollment vary across grade levels.

Building on this initial model, our second analysis is designed to provide information on the characteristics of individuals who—conditional on open enrolling in 2006-07—continue participating in interdistrict open enrollment in subsequent school years; it is intended to help develop an understanding of the dynamics of participation. We perform this analysis in a survival framework—an approach that has become increasingly common in the education policy literature in recent years (e.g. Podgursky, Monroe and Watson 2004; Howell 2004; Plank,

DeLuca, and Estacion 2008; Goldhaber and Hansen 2009; Cowen and Winters forthcoming). Specifically, we estimate the following model:

$$g_{id}(t) = k(t)\exp(\boldsymbol{\gamma F_i} + \boldsymbol{\delta S_{i,t-1}} + \boldsymbol{\theta D_{id,t-1}}) \quad (2)$$

In this model, the hazard that student *i* residing in district *d* fails to continue open enrolling at time *t* is the product of a baseline hazard function *k(t)*—assumed to take an exponential distribution—and an exponentiated linear combination of a vector of fixed student characteristics ***F***, a vector of time-varying student and family background characteristics ***S***, and a vector of characteristics of the student's district of residence ***D***.[11] The specific contents of the vectors of student and district characteristics were described above. As was the case with equation (1), we estimate equation (2) over three separate samples—1) individuals who open enrolled as kindergarteners in 2006-07, 2) individuals who open enrolled as 6th graders in 2006-07, and 3) individuals who open enrolled as 9th graders in 2006-07. We have complete data on the individuals in each of these samples through the 2009-10 school year, which permits analysis of open enrollment patterns over three subsequent school years.

Whereas our first two analyses provide information about individuals who open enrolled in 2006-07, our third analysis centers on individuals who did not open enroll in that year, but did participate in the program in subsequent years. We again perform this analysis in a survival framework and employ a model identical in structure to that presented in equation (2). However, there are two notable differences between the two analyses. First, in this analysis we estimate the model over samples that are entirely different from those used in the previous analysis. Specifically, in this analysis we estimate equation 2 separately for 1) members of the 2006-07 cohort of kindergarteners who did not open enroll as kindergarteners, 2) members of the 2006-07

[11] Substantively similar results are obtained when the baseline hazard rate is assumed to take a Weibull distribution or is left unspecified, which results in estimation of a Cox proportional hazards model. These results are available from the authors upon request.

6th grade cohort who did not open enroll as 6th graders, and 3) members of the 2006-07 cohort of 9th graders who did not open enroll in that year; we again have complete data on these sample members through the 2009-10 school year. Second, because the analytic samples consist of individuals that did not open enroll in 2006-07—coupled with the fact that we are interested in identifying the factors that predict open enrollment participation in future years—"failure" is now defined as beginning to open enroll in a subsequent school year. Consequently, this analysis identifies student- and district-level factors associated with increases or decreases in the hazard of beginning to open enroll, conditional on not open enrolling in 2006-07.

Taken together, these analyses will provide further insight into student participation in interdistrict open enrollment, as well as the dynamics of that participation. They will shed light on the role that a variety of student- and district-level factors play in predicting open enrollment participation in 2006-07 and also in subsequent years. Furthermore, the analyses will explore potential heterogeneity in interdistrict open enrollment participation through the analysis of three grade cohorts and the separate analysis of students who did and did not open enroll in the defined baseline year of 2006-07.

Multivariate Results

Table 7 presents the results of the model predicting open enrollment participation in the 2006-07 school year; the results are presented separately for kindergarteners, 6th graders, and 9th graders. The results reveal a number of patterns present across all grade levels. Specifically, Hispanic students were less likely than both Black and White students to open enroll in 2006-07. The results also demonstrate that students who were not eligible for free- or reduced-price lunch were more likely to open enroll, relative to students who were eligible to receive a subsidized lunch. In addition, students classified as gifted and talented or with limited English proficiency were less likely to open enroll than their peers without those classifications.

A number of district characteristics were also associated with interdistrict open enrollment participation across all grade levels. The results indicate negative relationships between open enrollment participation and both the percent of students who are White and enrollment levels; students in larger districts were less likely to open enroll in 2006-07, conditional on the contents of the model. In addition, the results demonstrate a positive relationship between open enrollment participation and both the dropout rate of students' district of residence.

[Insert Table 7 about here]

Table 7 also reveals that several significant predictors of open enrollment participation are more grade-specific in nature. For example, Black students were more likely than White students to open enroll in kindergarten and 6th grade, but not in 9th grade. Similarly, Asian kindergartners were more likely than White kindergarteners to participate in open enrollment, but there were no significant differences in either 6th or 9th grade. Individuals' math and reading scores were also significantly associated with open enrollment participation—math scores were negatively related while reading scores were positively related—in 6th grade, but not 9th grade. At the district level, Table 7 reveals a positive relationship between open enrollment participation and average reading achievement, the percent of students eligible for free- or reduced-price lunch, and the truancy rate at the 6th grade and 9th grade levels; no such relationships exist for kindergarteners, however. Finally, students in 6th and 9th grade were less likely to open enroll out of districts that offered a greater number of AP courses, but again no such relationship exists for kindergarteners.

The results presented in Table 8 build on those presented above by analyzing the factors associated with continuing to open enroll in subsequent school years. Four main findings

emerge from the results. First, the there is some evidence that Black students are less likely than both White and Hispanic students to continue open enrolling after 2006-07, at least in for the kindergarten and 6th grade cohorts we analyze; at the 9th grade level, Hispanic students are less likely to continue open enrolling after 2006-07 than White students, which is a reversal from the results for younger cohorts. Second, across all grade levels, students eligible for free lunch are less likely to continue open enrolling after 2006-07 than their more affluent peers. Third, there is a negative relationship between the percentage of students eligible for subsidized lunch in students' district of residence and the hazard of failing to open enroll after 2006-07; students who open enroll out of relatively high-poverty districts are disproportionately likely to continue open enrolling. Fourth, students who open enroll out of high-achieving districts are disproportionately likely to continue open enrolling in subsequent years, as evidenced by the significant, negative coefficient on the measure of average achievement.

[Insert Table 8 about here]

The results presented in Table 9 further our understanding of the dynamics of interdistrict open enrollment participation by analyzing—for students who did not open enroll in 2006-07—the factors associated with beginning to open enroll in subsequent school years. Four main findings emerge here as well. First, residing in a district with a large percentage of students eligible to receive subsidized lunch increases the hazard of beginning to open enroll. Second, residing in a district with high dropout rates and student-teacher ratios also increase the hazard of beginning to open enroll after not doing so in 2006-07. Third, students classified as gifted and talented, limited English proficient, or learning disabled are less likely to begin open enrolling—after not doing so in 2006-07— than their peers without those respective classifications. Finally, the results demonstrate that the factors associated with the hazard of beginning to open enroll are

different for the 9th grade cohort than for the other cohorts we examine. Specifically, females are more likely than males to begin open enrolling in high school; there is no difference between the sexes in earlier grades. Additionally, the coefficients on both the racial/ethnic variables and the measures of subsidized lunch eligibility vary across grades. For the kindergarten and 6th grade cohorts, students eligible for free lunch were significantly less likely than their more affluent peers to begin open enrolling. For the ninth grade cohort, however, no such relationship is observed; if anything, students eligible for free lunch may have been slightly more likely to begin open enrolling than their ineligible peers.

[Insert Table 9 here]

Discussion and Conclusion

The design of interdistrict open enrollment policies—coupled with their expansive nature and scope—provide these programs with the potential to affect several aspects of communities, including the socioeconomic composition of school districts, families' residential location choices, and school district finances, among others. Prior to gauging any potential large-scale effects of these policies, however, it is necessary to gain an understanding of a more basic, yet no less important, aspect of interdistrict open enrollment—the characteristics of participants and the dynamics of their participation. Drawing on five years of student-level data from the universe of students attending public schools in Colorado, this paper presents the results of analyses designed to do just that. More specifically, the results presented in the preceding sections provide insight into three main questions: Who open enrolls in a defined baseline year? Who keeps open enrolling? And who does not open enroll initially, but participates in the program in later years? A number of notable findings emerged from these analyses—findings that have several important implications for both research and policy.

All analyses made clear that socioeconomically disadvantaged students—as measured by free lunch eligibility—were significantly less likely to open enroll than their more affluent peers. Although such a scenario has been suggested by previous work on the topic (e.g. Reback 2008; Carlson, Lavery, and Witte 2011; Holme and Richards 2009), this study is the first to provide a convincing confirmation of the relationship by using multiple years of individual-level, statewide data. In providing such confirmation, the results bring to light a number of policy-relevant issues. First, such a finding is at odds with common rhetoric and conceptions regarding a primary goal of school choice programs—permitting disadvantaged students to attend higher quality schools. Although these programs undoubtedly serve that purpose for some disadvantaged students, the results presented above suggest that is not the primary way in which they are being used. Rather, it seems likely that the program's primary use is as a public school voucher program for middle-class and upper-middle-class families. Such usage patterns are not necessarily normatively undesirable, but they need to be recognized in order to have an honest discussion and debate about the operations and effects of interdistrict choice policies. Second, the fact that socioeconomically advantaged students are disproportionately likely to open enroll is relevant to concerns that interdistrict choice may increase stratification along socioeconomic dimensions; the exit of socioeconomically advantaged students from districts—coupled with their presumed enrollment in more advantaged districts—may result in greater concentrations of disadvantaged students in certain school districts.[12] While recognizing the validity of such concerns, the results also indicate that interdistrict open enrollment is unlikely to lead to substantial stratification along academic or racial/ethnic lines; the relationships between open

[12] We do not analyze the districts into which students open enroll in this paper. Previous work drawing on district-level data has suggested that students open enroll into districts that are more advantaged along several dimensions (Carlson, Lavery and Witte 2011; Reback 2008; Welsh, Statz, and Skidmore 2010).

enrollment participation and test scores or race/ethnicity are relatively asystematic, if they exist at all.

In addition to revealing differences in the likelihood of participating in interdistrict open enrollment, the results of the preceding analyses also indicated substantial variation in the stability of open enrollment participation across demographic groups. In particular, the results in Tables 6, 8, and 9 demonstrate that Black students exhibit far less stable participation patterns than their White counterparts. Similarly, socioeconomically advantaged students display far more stable participation patterns than their less advantaged peers. Although there has been little explicit inquiry into the effect of school choice programs on student mobility, this study is the latest in a series of analyses to detect substantial rates of movement into and out of school choice programs for these student populations. Specifically, analyses have demonstrated very high rates of student mobility in school voucher programs in Milwaukee (Cowen, Fleming, Witte, and Wolf 2012; Carlson, Cowen, and Fleming forthcoming), Washington DC (Wolf et al. 2010), and New York City (Howell 2004), as well as charter schools in several states including Florida, Texas, and Idaho (Ballou et al. 2006; Cowen and Winters forthcoming; Hanushek et al., 2007). Such findings raise the possibility that increased levels of student mobility—particularly for disadvantaged populations—represent an unintended consequence of school choice policies, a possibility that is potentially troublesome given the large body of work demonstrating student mobility to have a negative effect on academic outcomes, specifically student achievement (Alexander, Entwisle, and Dauber 1996; Hanushek, Kain, and Rivkin 2004; Ingersoll, Scamman, and Eckerling 1989; Kerbow, Azcoitia, and Buell 2003; Lash and Kirkpatrick 1990, 1994; Rumberger et al. 1999; South, Haynie, and Bose 2007; Temple and Reynolds 1999; Xu, Hannaway, and D'Souza 2009; Zimmer et al. 2009; Engberg et al. 2012). In the light of such

possibilities, the results suggest that policymakers should concentrate on not only using school choice programs to provide disadvantaged populations with access to high-quality schools, but also to design such programs in a manner that maximizes the stability and continuity of that access.

The results in Tables 3, 7, and 9 make clear that students with special designations—ELL, gifted and talented, and learning disabled—are significantly less likely to open enroll than students without those designations. Less clear is whether the lower rates of participation for these populations are due to families' choice or to districts' refusals of transfer applications. As described earlier, districts can legally refuse transfer applications if they do not offer the programs necessary to serve a student. However, given the significantly lower rates of open enrollment by students with special designations, it may be advisable to ensure that districts are not simply using that provision to refuse the applications of students who are more expensive or difficult to serve.

Perhaps not surprisingly, the results revealed heterogeneity in the correlates of open enrollment participation across grade levels. Factors found to be related to interdistrict choice participation at some grade levels were wholly absent from others. For example, race/ethnicity was a significant predictor of open enrollment participation at the elementary and middle school levels, but not at the high school level. Similarly, test scores predicted open enrollment participation for the 6^{th} grade cohort, but not the 9^{th} grade cohort. Such heterogeneity is suggestive of a scenario where interdistrict open enrollment is being used for different purposes at different grade levels. Although our data allow us to gain significant insight into the characteristics of interdistrict open enrollment participants, they lack the detail required to determine the specific purpose of each open enrollee with certainty. For example, our data do

not contain measures of convenience, such as the location of parents' workplaces, or measures of participation in athletics or extracurricular activities, which could be related to open enrollment participation decisions.

This paper provides a thorough and wide-ranging analysis of the characteristics of open enrollment participants and the dynamics of their participation. A number of questions follow naturally from such an analysis. Into which districts do these students open enroll? What factors determine that choice? Such questions have been the subject of previous research using district-level data (e.g. Reback 2008; Welsh, Statz, and Skidmore 2010; Carlson, Lavery, and Witte 2011), but we plan to explore these topics at the individual level in future research. Perhaps even more important are questions regarding the effect of interdistrict open enrollment participation on academic outcomes of interest, such as student achievement, attainment, and even coursetaking. Such questions have been explored in the contexts of other school choice programs, particularly charter schools (e.g. Bifulco and Ladd 2006; Sass 2006; Witte et al. 2007) and school vouchers (e.g. Witte 2000; Rouse 1998; Wolf et al. 2010; Howell and Peterson 2002), but there has been little inquiry into such potential effects of the nation's largest school choice program—interdistrict open enrollment.

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Tables and Figures

Table 1. Number of states with interdistrict open enrollment programs, by program type

Program type	Number of states
Any interdistrict open enrollment program	**42**
Voluntary only	23
Mandatory only	13
Both voluntary and mandatory	6

Table 2. Total enrollment in Colorado, interdistrict open enrollment, and charter schools, by year

Year	Total (K-12)	OE	Charter
2000-01	724,508	22,993	21,064
2001-02	742,145	23,979	24,658
2002-03	751,862	30,846	28,782
2003-04	757,668	35,752	31,529
2004-05	766,657	38,780	36,658
2005-06	780,708	42,278	44,254
2006-07	794,026	48,543	52,242
2007-08	802,639	51,430	56,772
2008-09	818,443	57,274	57,843
2009-10	832,368	60,916	66,556
2010-11	843,316	66,296	72,989
2011-12	854,265	68,829	77,853

Source: Colorado Department of Education

Table 3. Percent of students who open enroll, by grade and demographic characteristics: 2005-06 to 2009-10 school years

	School Year				
Characteristic	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**
Grade					
Pre-K	1.92	1.98	1.66	1.93	1.79
Kindergarten	4.60	5.43	5.07	5.45	5.17
Grade 1	4.84	5.13	5.52	5.56	5.68
Grade 2	4.65	5.15	5.50	5.83	5.92
Grade 3	4.75	5.16	5.41	5.81	6.03
Grade 4	4.57	5.10	5.39	5.83	5.98
Grade 5	4.39	4.86	5.23	5.61	5.86
Grade 6	4.46	4.83	5.14	5.80	6.04
Grade 7	4.26	4.85	5.15	5.82	6.10
Grade 8	4.29	4.82	5.18	5.93	6.14
Grade 9	4.90	5.68	5.72	7.16	7.65
Grade 10	5.56	5.81	6.26	7.18	7.77
Grade 11	5.88	6.37	6.55	7.18	8.06
Grade 12	6.63	6.77	7.30	7.17	8.12
Sex					
Male	4.64	5.08	5.27	5.72	6.08
Female	5.02	5.48	5.76	6.33	6.68
Race/ethnicity					
White	5.01	5.43	5.74	6.32	6.67
Hispanic	4.23	4.62	4.71	5.17	5.51
Black	5.64	6.84	7.09	7.14	7.73
Asian	4.74	5.14	5.23	5.87	5.88
Native American	4.93	4.65	5.02	5.64	6.73
Free lunch status					
Free Lunch	3.58	3.84	4.00	4.70	4.92
Reduced Lunch	5.05	5.67	6.19	6.65	6.89
No Lunch	5.26	5.75	6.06	6.34	7.01
Gifted and talented status					
Not Gifted and Talented	4.91	5.39	5.65	6.17	6.55
Gifted and Talented	3.68	3.66	3.63	4.05	4.17
ELL status					
English Native	5.16	5.70	5.97	6.42	6.84
ELL	2.82	2.89	3.05	3.93	4.06
Disability status					
No Disability	4.98	5.46	5.68	6.22	6.58
Disability	3.56	3.44	3.82	4.02	4.27

Table 4. Average district characteristics, by open enrollment status and year

	2005-06		2006-07		2007-08		2008-09		2009-10	
District Characteristic	**OE**	**Not OE**	**OE**	**Not OE**	**OE**	**Not OE**	**OE**	**Not OE**	**OE**	**Not OE**
Percent Free or Reduced Lunch	41.0	33.9	42.4	34.8	43.6	35.8	47.0	38.7	48.2	40.3
Percent White	54.8	61.8	53.3	61.2	53.3	60.7	53.1	60.5	50.1	56.7
Average District Achievement Reading	-0.04	-0.01	-0.08	-0.01	-0.08	-0.01	0.01	-0.01	0.01	-0.01
District Made AYP	0.11	0.07	0.09	0.06	0.05	0.03	0.05	0.04	0.06	0.04
Number of AP Courses Offered	10.6	11.7	14.6	17.0	15.6	18.1	15.0	18.1	15.6	18.4
District Enrollment	27,941	33,462	28,918	33,676	28,386	34,099	28,796	34,893	29,915	35,712
District Dropout Rate	5.2	4.3	5.2	4.3	4.2	3.6	4.1	3.5	3.6	3.0
Pupil/Teacher Ratio	17.1	17.4	17.0	17.3	16.9	17.3	17.0	17.3	17.6	17.9
District Truancy Rate	2.4	2.1	2.4	2.0	2.5	2.2	2.3	2.0	2.3	2.1

Table 5. Average standardized CSAP score and ACT scale score, by open enrollment status and grade: 2005-06 to 2009-10 school years

	2005-06		2006-07		2007-08		2008-09		2009-10	
Subject	**OE**	**Not OE**	**OE**	**Not OE**	**OE**	**Not OE**	**OE**	**Not OE**	**OE**	**Not OE**
Math										
Grade 3	0.06	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	0.08	0.00
Grade 4	0.05	0.00	0.00	0.00	0.02	0.00	-0.02	0.00	0.00	0.00
Grade 5	-0.01	0.00	0.01	0.00	-0.01	0.00	-0.02	0.00	-0.02	0.00
Grade 6	0.03	0.00	-0.03	0.00	-0.03	0.00	-0.06	0.00	-0.02	0.00
Grade 7	0.02	0.00	-0.02	0.00	0.03	0.00	-0.03	0.00	-0.01	0.00
Grade 8	-0.02	0.00	-0.06	0.00	-0.03	0.00	-0.07	0.00	-0.06	0.00
Grade 10	-0.05	0.00	-0.11	0.01	-0.04	0.00	-0.09	0.01	-0.08	0.01
Reading										
Grade 3	0.14	-0.01	0.07	0.00	0.06	0.00	0.06	0.00	0.11	-0.01
Grade 4	0.09	0.00	0.07	0.00	0.06	0.00	0.05	0.00	0.05	0.00
Grade 5	0.09	0.00	0.07	0.00	0.07	0.00	0.06	0.00	0.05	0.00
Grade 6	0.12	-0.01	0.07	0.00	0.07	0.00	0.08	0.00	0.07	0.00
Grade 7	0.09	0.00	0.07	0.00	0.08	0.00	0.06	0.00	0.08	0.00
Grade 8	0.07	0.00	0.01	0.00	0.06	0.00	0.04	0.00	0.06	0.00
Grade 10	-0.03	0.00	-0.05	0.00	0.00	0.00	0.01	0.00	0.03	0.00
ACT										
English	17.9	18.1	17.9	18.2	18.2	18.6	18.6	18.6	18.1	18.7
Reading	19.0	19.3	19.1	19.3	19.3	19.6	20.1	20.0	19.2	19.6
Math	18.2	18.8	18.6	19.1	18.8	19.3	19.2	19.5	18.6	19.4
Science	18.7	19.0	18.6	19.0	19.2	19.6	19.6	19.7	18.9	19.6
Composite	18.6	18.9	18.7	19.0	19.0	19.4	19.5	19.6	18.8	19.4

Table 6: Open enrollment transition probabilities, by demographic characteristics

Characteristics	OE to OE	OE to No OE	No OE to No OE	No OE to OE
All students	**71.1**	**28.9**	**97.9**	**2.1**
Grade level				
Elementary	72.8	27.2	98.2	1.8
Middle	73.4	26.6	98.2	1.8
High School	70.9	29.1	97.2	2.8
Sex				
Male	70.8	29.2	98.0	2.0
Female	71.5	28.6	97.8	2.2
Race/ethnicity				
White	74.2	25.8	98.1	1.9
Hispanic	68.6	31.5	97.9	2.2
Black	62.2	37.8	96.7	3.3
Asian	75.8	24.2	98.4	1.6
Native American	69.6	30.4	98.1	1.9
Free lunch status				
Free Lunch	65.8	34.2	98.2	1.8
Reduced Lunch	76.1	23.9	98.3	1.8
No Lunch	74.9	25.1	98.1	1.9
Gifted and talented status				
Not Gifted and Talented	70.9	29.1	97.8	2.2
Gifted and Talented	83.8	16.2	99.3	0.7
ELL status				
English Native	71.8	28.2	97.8	2.2
ELL	70.5	29.5	98.6	1.4
Disability status				
No Disability	71.5	28.5	97.8	2.2
Disability	72.4	27.6	98.5	1.5

Table 7. Results from logit model predicting open enrollment in 2006-07, by grade

Characteristic	KG	6th Grade- No Test Scores	6th Grade- Test Scores	9th Grade
Student Characteristics				
Female	0.0307	0.0880**	0.0473	0.0768*
	(0.0352)	(0.0401)	(0.0413)	(0.0396)
Hispanic	-0.463***	-0.205***	-0.175***	-0.140**
	(0.0584)	(0.0599)	(0.0613)	(0.0581)
Black	0.197***	0.160*	0.152*	-0.00258
	(0.0682)	(0.0832)	(0.0864)	(0.0835)
Asian	0.347***	-0.113	-0.0946	-0.172
	(0.0884)	(0.116)	(0.119)	(0.125)
Native American	-0.345**	-0.263	-0.315	0.143
	(0.174)	(0.217)	(0.226)	(0.162)
Reduced-price lunch	0.651***	0.353***	0.358***	0.0694
	(0.0871)	(0.0868)	(0.0878)	(0.0903)
Not eligible for free/reduce lunch	0.845***	0.644***	0.617***	0.514***
	(0.0575)	(0.0600)	(0.0624)	(0.0576)
Lunch eligibility missing	1.911***	0.964***	1.097***	NA
	(0.147)	(0.337)	(0.339)	
Gifted and talented	-0.402	-0.256***	-0.154**	-0.189***
	(0.281)	(0.0714)	(0.0776)	(0.0694)
Limited English proficiency	-1.171***	-0.524***	-0.466***	-0.352***
	(0.0862)	(0.106)	(0.109)	(0.110)
Disability	-0.803***	-0.157**	-0.134*	-0.118
	(0.0956)	(0.0662)	(0.0751)	(0.0785)
Math achievement	NA	NA	-0.139***	-0.0292
			(0.0356)	(0.0337)
Reading achievement	NA	NA	0.0939**	0.0496
			(0.0380)	(0.0357)
District Characteristics (Lagged)				
Percent eligible free/reduced lunch	0.00118	0.0192***	0.0199***	0.0246***
	(0.00232)	(0.00272)	(0.00275)	(0.00262)
Percent White	-0.0197***	-0.0202***	-0.0215***	-0.0189***
	(0.00288)	(0.00265)	(0.00272)	(0.00263)
Average district achievement- Reading	0.382	2.862***	3.270***	2.291***
	(0.266)	(0.209)	(0.205)	(0.195)
District made AYP	0.349***	0.449***	0.415***	0.756***
	(0.0903)	(0.0928)	(0.0936)	(0.0911)
Number of AP courses offered	0.00144	-0.0313***	-0.0346***	-0.0300***
	(0.00491)	(0.00284)	(0.00284)	(0.00274)
Enrollment (thousands)	-0.0111***	-0.00905***	-0.00927***	-0.00385***
	(0.00160)	(0.000959)	(0.000974)	(0.000883)
Dropout rate	0.0635***	0.0918***	0.0951***	0.0582***
	(0.0103)	(0.0109)	(0.0114)	(0.0106)
Student-teacher ratio	-0.0567***	0.00264	-0.00148	0.0603***
	(0.0171)	(0.0207)	(0.0199)	(0.0199)
Truancy rate	0.00178	0.143***	0.169***	0.141***
	(0.0232)	(0.0283)	(0.0279)	(0.0277)

Table 7. Results from logit model predicting open enrollment in 2006-07, by grade

Characteristic	KG	6th Grade-No Test Scores	6th Grade-Test Scores	9th Grade
Constant	-1.205***	-3.057***	-2.965***	-4.258***
	(0.354)	(0.446)	(0.440)	(0.432)
Observations	64792	56580	54875	57389

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8. Results of hazard models of continuing participation in interdistrict open enrollment , by grade

Characteristic	KG	6th Grade-No Test Scores	6th Grade-Test Scores	9th Grade
Student Characteristics				
Female	-0.0224	-0.0375	-0.0506	-0.0142
	(0.0442)	(0.0536)	(0.0582)	(0.0649)
Hispanic	-0.132*	-0.128	-0.155*	0.157*
	(0.0676)	(0.0789)	(0.0821)	(0.0866)
Black	0.131*	0.222**	0.152	0.0761
	(0.0710)	(0.108)	(0.116)	(0.137)
Asian	-0.164	0.00582	0.0645	-0.209
	(0.121)	(0.153)	(0.160)	(0.229)
Native American	0.284	-0.0983	-0.0799	-0.102
	(0.185)	(0.258)	(0.253)	(0.295)
Reduced-price lunch	-0.114	0.0190	-0.00394	-0.129
	(0.0927)	(0.117)	(0.120)	(0.142)
Not eligible for free/reduce lunch	-0.226***	-0.148*	-0.149*	-0.303***
	(0.0572)	(0.0780)	(0.0804)	(0.0846)
Lunch eligibility missing	-0.388**	0.999***	1.055***	NA
	(0.166)	(0.161)	(0.171)	
Gifted and talented	-0.279	0.0343	0.234**	-0.300*
	(0.171)	(0.0962)	(0.103)	(0.157)
Limited English proficiency	-0.0604	-0.0435	-0.150	0.497***
	(0.0971)	(0.185)	(0.192)	(0.129)
Disability	-0.130	0.302***	0.109	0.216*
	(0.133)	(0.0920)	(0.108)	(0.124)
Math achievement	NA	NA	-0.185***	NA
			(0.0476)	
Reading achievement	NA	NA	-0.00703	NA
			(0.0482)	
District Characteristics (Lagged)				
Percent eligible free/reduced lunch	-0.00735***	-0.00776**	-0.00825**	-0.00879**
	(0.00270)	(0.00323)	(0.00343)	(0.00346)
Percent White	-0.00390	-0.00549*	-0.00587*	-0.00503
	(0.00243)	(0.00299)	(0.00316)	(0.00328)
Average district achievement-Reading	-0.775***	-0.564***	-0.418***	-0.853***
	(0.0588)	(0.0791)	(0.0929)	(0.0908)
District made AYP	0.0563	-0.0270	-0.0600	0.0311
	(0.117)	(0.135)	(0.144)	(0.139)
Number of AP courses offered	0.00120	0.00584	0.00480	-0.0121*
	(0.00472)	(0.00599)	(0.00663)	(0.00705)
Enrollment (thousands)	-0.00164	0.000531	0.00124	-0.00243
	(0.00162)	(0.00204)	(0.00223)	(0.00270)
Dropout rate	0.0180*	-0.00122	-0.00535	0.00683
	(0.0108)	(0.0145)	(0.0151)	(0.0133)

Table 8. Results of hazard models of continuing participation in interdistrict open enrollment , by grade

Characteristic	KG	6th Grade-No Test Scores	6th Grade-Test Scores	9th Grade
Student-teacher ratio	-0.00981	0.00383	0.00410	-0.000112
	(0.00866)	(0.00259)	(0.00281)	(0.00522)
Truancy rate	-0.0334	-0.00220	-0.00361	0.0294
	(0.0223)	(0.0332)	(0.0365)	(0.0223)
Constant	-0.548*	-0.925***	-0.873***	-0.777**
	(0.299)	(0.314)	(0.331)	(0.367)
Observations	6569	4513	4229	4530

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9. Results of hazard models of beginning to participate in interdistrict open enrollment, by grade

Characteristic	KG	6th Grade-No Test Scores	6th Grade-Test Scores	9th Grade
Student Characteristics				
Female	0.0529	0.0475	0.0359	0.167***
	(0.0387)	(0.0355)	(0.0375)	(0.0316)
Hispanic	0.105*	-0.141***	-0.146**	0.252***
	(0.0579)	(0.0543)	(0.0571)	(0.0447)
Black	0.493***	0.0434	0.0248	0.426***
	(0.0749)	(0.0766)	(0.0808)	(0.0622)
Asian	0.247**	-0.161	-0.130	-0.169
	(0.108)	(0.109)	(0.112)	(0.109)
Native American	-0.195	0.258*	0.247*	0.339***
	(0.195)	(0.139)	(0.147)	(0.124)
Reduced-price lunch	0.405***	0.116*	0.147**	-0.121*
	(0.0688)	(0.0698)	(0.0712)	(0.0714)
Not eligible for free/reduce lunch	0.169***	0.131***	0.132**	-0.0400
	(0.0540)	(0.0501)	(0.0528)	(0.0440)
Lunch eligibility missing	0.716***	1.262***	1.224***	NA
	(0.155)	(0.312)	(0.375)	
Gifted and talented	-0.742***	-0.172***	-0.0916	-0.755***
	(0.152)	(0.0582)	(0.0649)	(0.0753)
Limited English proficiency	-0.672***	-0.427***	-0.469***	-0.164**
	(0.0704)	(0.0818)	(0.0864)	(0.0660)
Disability	-0.255***	-0.155**	-0.145**	-0.265***
	(0.0745)	(0.0618)	(0.0724)	(0.0609)
Math achievement	NA	NA	-0.0957***	NA
			(0.0311)	
Reading achievement	NA	NA	0.0231	NA
			(0.0323)	
District Characteristics (Lagged)				
Percent eligible free/reduced lunch	0.00483*	0.0120***	0.0119***	0.00599***
	(0.00247)	(0.00224)	(0.00234)	(0.00188)
Percent White	-0.000993	-0.00487**	-0.00611**	-0.00337*
	(0.00241)	(0.00224)	(0.00238)	(0.00185)
Average district achievement-Reading	-0.00252	0.00774	0.0268	-0.0128
	(0.182)	(0.167)	(0.174)	(0.134)
District made AYP	0.534***	0.515***	0.544***	0.330***
	(0.0941)	(0.0827)	(0.0861)	(0.0807)
Number of AP courses offered	-0.00337	-0.00736*	-0.00691	-0.00776**
	(0.00464)	(0.00403)	(0.00422)	(0.00364)
Enrollment (thousands)	-0.00413***	-0.000151	-0.000154	0.00181
	(0.00150)	(0.00125)	(0.00131)	(0.00110)
Dropout rate	0.0787***	0.0484***	0.0471***	0.0653***
	(0.0116)	(0.0111)	(0.0115)	(0.00782)
Student-teacher ratio	0.0138***	0.0114***	0.0116***	0.0136***
	(0.00131)	(0.00259)	(0.00260)	(0.00122)

Table 9. Results of hazard models of beginning to participate in interdistrict open enrollment, by grade

Characteristic	KG	6th Grade-No Test Scores	6th Grade-Test Scores	9th Grade
Truancy rate	0.00271	-0.0349*	-0.0406**	-0.0524***
	(0.0243)	(0.0198)	(0.0206)	(0.0187)
Constant	-4.784***	-4.321***	-4.286***	-4.156***
	(0.243)	(0.234)	(0.247)	(0.194)
Observations	165,551	155,778	149,707	160,046

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1