AN EMPIRICAL INVESTIGATION OF THE NO CHILD LEFT BEHIND SCHOOL CHOICE POLICY ON ACADEMIC ACHIEVEMENT

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Abstract

This paper empirically examines the underlying premise of the No Child Left Behind (NCLB) school choice provision that students will perform better when they are given the opportunity to transfer from persistently low-performing schools to higher performing schools. We focus on students who move from schools that must offer choice under NCLB in a western state to public schools that can accept transfer students to determine if these students attain higher growth rates in mathematics and reading achievement than students who stay in schools that must offer choice. Using data from the Northwest Evaluation Association and cross-classified random effects growth models, we find that students who make the NCLB policy relevant move experience initial negative bumps in achievement levels that are not compensated for with the small boost in achievement growth in the higher quality school over an academic year. Additionally, students who opt to not make the NCLB choice move have faster achievement growth rates than students who make the policy relevant move. Based on our results, the compensatory goals of the NCLB school choice policy does not appear to work as intended in the western state we analyze.

Key Words: academic achievement, cross-classified random effects growth model, math growth, No Child Left Behind, propensity score analysis, reading growth, school choice, student mobility

The federal No Child Left Behind Act of 2001 (NCLB) produced several new policy mechanisms designed to improve student achievement, including annual testing for grades three through eight, public school choice, supplemental educational services, and requirements for highly qualified teachers. A few years into the implementation of NCLB, the school choice provision remains one of the more controversial, yet largely speculative policy mandates for ensuring that all students attain academic proficiency by the year 2014. The underlying premise of the school choice provision is that low-achieving and low-income students will perform better when they are given the opportunity to transfer from persistently low-performing schools to higher performing schools.

Findings from the student mobility research suggest that a school choice policy targeted precisely at the types of students that have not benefited from moving between schools may lead to unintended policy consequences, such as students performing lower in their new school than if they had stayed in their original school. One limitation of these findings is that few of the student mobility studies distinguish between the types of school moves. Students move to new schools for a variety of reasons, including but not limited to residential moves, family instability, school closure, school safety, and parents seeking out higher quality schools. The reason a student changes schools may impact the outcome of the move on achievement (Hastings, Kane & Staiger, 2006). Although we are unable to control for all of the possible reasons that students switch schools, we can model the policy conditions set forth by the NCLB school choice provision to examine whether students who move from low-performing schools to higher-performing schools perform better than students who stay in low-performing schools. This paper investigates the underlying policy assumption of the choice provision: when parents are allowed

to choose a higher performing public school for their children, will these choices improve academic achievement?

Under the NCLB school choice provision, students attending Title I schools identified for school improvement because the schools did not make adequate yearly progress (AYP) for two consecutive years are provided with the choice to transfer to a public or charter school within the district that has not been identified for school improvement. A meaningful percentage of districts across the nation contain schools that have consistently failed to make AYP, thus triggering the school choice provision. The Center on Education Policy (2006) reports that approximately 14 percent of districts in the 2005-2006 school year were required to offer school transfers, and roughly 43 percent of urban districts had schools that required this option. Yet, only small percentages of students and their families are exercising the choice option. The Citizens' Commission on Civil Rights (2004) estimates that 1.3 and 1.7 percent of eligible students took advantage of transferring from their lower performing schools in the 2002-2003 and 2003-2004 school years, respectively. A survey by the Council of Great City Schools found that only 1.5% of students transferred schools under the NCLB choice policy during the 2003-2004 school year (Casserly, 2004). The National Assessment of Title I finds that the number of students participating in school choice under NCLB across the nation increased from 18,000 in 2002-2003 to 38,000 and 48,000 in 2003-2004 and 2004-2005, respectively. While the numbers of students participating in NCLB choice are increasing, a significantly larger number of students are staying in schools that must offer choice and making use of supplemental educational services, roughly 446,000 in 2004-2005 (U.S. Department of Education, 2007).

What explains the under-utilization of the federal public school choice policy? Howell (2006) finds that while all parents in the sample are generally aware and knowledgeable about

the NCLB choice provisions, parents of students in higher performing schools are more likely than parents of students in lower performing schools to correctly identify the school improvement status of their schools. Further reasons may include the lack of physical space and/or seats in higher-performing schools for transfer students, the need to maintain class size limits, schools' ability to overcome parents' dissatisfaction with the quality of their existing schools, and parental desire to have their child attend a school close to home even when offered the choice to transfer to a higher-performing school (Center on Education Policy, 2005, 2006; Hamilton et al., 2007; Marsh, Barney, & Russell, 2005).

Despite the fact that the numbers of students taking advantage of the federal school choice option are small and access to data on students participating is limited, the federal school choice policy relies on specific theoretical assumptions about student mobility that have yet to be empirically assessed. This paper examines the experience of students who move from persistently low-performing schools to higher performing schools during the 2004-05 and 2005-06 school years, the first years that students were given the opportunity to transfer schools under NCLB. We use four years of state-wide standardized achievement data used to determine AYP in a western state, as well as school- and district-level data specific to the NCLB school choice policy, such as yearly AYP determinations and intra-district choice constraints. We focus on students who move from schools that must offer choice under NCLB to public schools that can accept transfer students to determine if these students attain higher growth rates in mathematics and reading achievement than students who stay in schools that must offer choice. We estimate the effects of the school choice policy with a cross-classified random effects model. The primary model is run with a larger statewide population of students who attend schools that must offer choice. A similar model is run with a sample selected through propensity score matching at the

student level to test the robustness of the findings. If the theoretical assumptions of the NCLB choice policy hold, students who move to higher performing schools will attain higher growth rates than students who stay in low performing schools. We hypothesize that students who make the policy relevant moves will initially have lower growth rates due to the negative effects of student mobility. The amount of time students spend in the new school may compensate for the initial drop in academic achievement.

In these analyses, we cannot specify which of the student moves are as a direct result of the NCLB school choice provision. In fact, because so few parents are taking advantage of the choice option (less than 2 percent, nationally), it is likely that many of the transfers between schools in our sample are not due to the federal policy. However, utilizing multiple models to control for mover self-selection bias, we provide an empirical framework to examine what it means for students that make the move from persistently low-performing schools to higher performing schools that parallels the precise policy in question.

Research on Student Mobility

Student mobility refers to students who change schools mid-year or before they are promoted to the next level of school (e.g., from elementary school to middle school). By and large, researchers and educators do not view student mobility as contributing to a positive educational experience for students. A meta-analysis of research on student mobility finds that the effect sizes for mobility are -0.25 for reading and -0.22 for math, equivalent to a three to four month difference in achievement between mobile and non-mobile students. Furthermore, mobility had a greater negative impact on the academic achievement of frequently mobile students, low SES students, and students enrolled in the early grades (Mehana & Reynolds,

2004). The authors note that one methodological limitation of the studies on student mobility is that they frequently do not control for prior achievement.

Student Mobility as a Risk Factor

Lower academic achievement due to mobility has also been found to be associated with a higher probability for grade retention and dropping out of school. A report on mobility by the United States General Accounting Office (1994) finds that students from low-income families and students who attend urban schools are more likely to change schools frequently. Moreover, many of the students in this report who make frequent moves are performing below grade level and are more likely to repeat a grade level than students who have never changed schools. High school students who change schools have a higher probability of dropping out of school or enrolling in an alternative educational program than students who do not change schools (Rumberger & Larson, 1998). In addition to the effect on academic achievement, researchers find that mobility is associated with behavioral problems such as poor work habits and limited cooperation (Nelson et al., 1996; Simpson & Fowler, 1994; Wood et al., 1993). The research suggests that not only are many students who switch schools at a higher risk educationally, but that mobility itself places students at an educational disadvantage.

Students change schools regularly and for a variety of reasons. In the research on student mobility, mobility is regarded as a phenomenon of student behavior that is basically unavoidable and consequently, schools are limited in their capacity to reduce student mobility. Findings from the student mobility literature may help us think about what we can expect from public school choice policy where students in low-performing schools are encouraged to move to higher performing schools. Changing schools may lead to discontinuity in the sequence of curriculum and instruction and create disruptions in peer networks (Haynie, South, & Bose, 2006; Lash &

Kirkpatrick, 1990; South & Haynie, 2004). Multiple moves in a student's academic career may compound the negative effects of mobility (Kerbow, 1996; Temple & Reynolds, 1999). Students who move may experience a period of adjustment before they show improvements in academic achievement (Swanson & Schneider, 1999). In response, the student mobility literature provides educators with recommendations for mitigating the negative impact of changing schools such as ensuring that prior achievement data follows the student to the new school, implementing strategies for involving families in school activities, and enhancing student engagement in the new school (Kerbow, 1996; Rumberger & Larson, 1998).

Mobility in the Context of NCLB

The difference between student mobility as it has traditionally been regarded and student mobility under the NCLB school choice provision is that the federal policy regards students changing schools as a bona fide educational reform initiative when the movement is strategic. The reason for the move is critical to the theoretical assumptions of the NCLB school choice policy. There is some evidence that students who move to a better school may experience improvements in their academic achievement. Families have used residential mobility as a form of de facto school choice to seek out higher quality schools for years (Schneider, Teske, & Marschall, 2000). Approximately 15 to 20 percent of school-aged children move each year on account of residential mobility (U.S. Census Bureau, 2004). Research indicates that households value school quality and are willing to pay for it in housing prices in order to live in areas with better schools (Bayer, Ferreira, & McMillan, 2004; Bayoh, Irwin, & Haab, 2006; Black, 1999; Dills, 2004; Figlio & Lucas, 2004).

The field of economics refers to the pursuit of higher quality schools as Tiebout mobility. For instance, Hanushek, Kain, and Rivkin (2004) compare inter-district moves with intra-district

moves to examine the impact on student achievement of selecting schools based on quality. The study assumes that families who make inter-district moves are more likely to consider the quality of schools than families making intra-district moves. Findings from this study indicate that inter-district moves produce small but statistically significant student achievement gains, while intra-district moves are associated with greater short-term academic disruptions, particularly for low income and minority students. The NCLB school choice provision aims to provide families who may otherwise not have the ability to move to a new neighborhood with the opportunity to choose schools based on quality, with the underlying assumption that this will lead to improvements in student performance.

Summary

The potential academic impact for students who change schools differs based on two conflicting bodies of research. The student mobility literature suggests that moving to a new school may be educationally and socially disruptive, especially for students who are already educationally at-risk. On the other hand, when parents are able to select higher quality schools, the advantages of the higher quality school may outweigh the disruptive impact of changing schools. Given the results from the research on student mobility and the selection of higher quality schools, we expect that students who move from schools identified as low-performing under NCLB to higher performing schools will experience an initial negative achievement bump due to the disruptive impact of changing schools. However, we hypothesize that the change to a higher performing school will lead to an increase in achievement growth over time compared to the growth that would be expected for students who stay in persistently low-performing schools.

Data & Methods

The NCLB school choice policy assumes that students will perform better if they are allowed to move from persistently low-performing schools to higher quality schools. Measuring the impact of NCLB school choice policy relevant moves on student performance requires longitudinal student achievement data to track students who change schools over time. Given the hierarchical nature of education settings, estimates of student achievement growth should be nested within schools to account for the interdependence of observations by partitioning the shared variance into within- and between-school components. However, because we want to estimate students who change schools over time, as well as take into account the changing characteristics of schools based on NCLB AYP classifications, traditional hierarchical linear models are insufficient. Therefore, we use cross-classified random effects growth models (HCM) wherein students are cross-classified with schools in the second level so that test scores and other individual time-varying covariates are nested within the student and the correct schools. Students and schools are cross-classified in the second level of the model to capture student mobility and changing school conditions over time (Meyers & Beretvas, 2006; Raudenbush & Bryk, 2002).

The appropriate estimation of the impact of the NCLB school choice policy must allow students to stay in their school or change schools between testing time points, as well as permit school characteristics to change over time. To accommodate both of these issues, we apply the approach used by Rowley (2005) whereby schools are assigned unique identification numbers for each semester. This strategy provides two advantages. First, the approach maintains the correct nesting of students within schools whether or not the student moves at each time point.

Second, the unique identifiers allow students who change schools, as well as students who stay in the same school to experience changing school characteristics over time. The modified HCM approach allows us to estimate the impact of movement from schools that must offer choice under NCLB to higher quality schools controlling for prior levels of student performance, as well as previous schooling experiences. Our models include students who make policy relevant moves as well as students who attend schools that must offer choice but do not make the policy relevant move. To test the robustness of our findings and control for self-selection among the movers, we use propensity score analysis to create a matched sample of policy relevant students and comparison students and compare the findings to the results from the larger sample.

Data

We use the Northwest Evaluation Association (NWEA) Growth Research Database (GRD) to examine patterns of mobility during the first four years of NCLB in a western state. NWEA contracts with districts and states to provide computerized adaptive student assessments aligned to the academic standards of the state. NWEA assesses students in mathematics, reading, and language arts using a one-parameter Item Response Theory model to place all students on a single developmental, vertically equated scale, called an RIT scale, for each of the subject areas (see Hambleton, 1989; Ingebo, 1997; Lord, 1980). We use only the math and reading scores in our analysis, as they are the subjects that are linked with NCLB AYP for our study period. NWEA research provides evidence demonstrating that the scales are extremely stable over twenty years (Kingsbury, 2003; Northwest Evaluation Association, 2002, 2003). Students are assigned unique identification numbers so that their RIT scores can be linked longitudinally and used to determine growth in academic achievement.

During the first four years of NCLB, the western state in our study used the NWEA mathematics and reading tests as its statewide standards-based assessment to determine if schools meet AYP targets. Participation rates for students tested by NWEA in this state are above 90 percent in grades two through ten. We use eight semesters of assessment data in mathematics and reading from fall 2002 to spring 2006 to estimate growth in student achievement. An advantage to hierarchical growth modeling is that it is not necessary that students have a test score present in each semester of the study. For the study sample, students who make policy relevant moves must have at least two test scores between fall 2003 and spring 2006, the NCLB school choice policy years, to be included in the sample. Students in the comparison group who attend a school that must offer choice need a minimum of one test score present between fall 2003 and spring 2006. Our sample includes students who were tested in a traditional public or charter schools during the eight semesters. Students tested in private non-denominational schools, private religious schools, alternative and vocational schools, special education schools, and home schooled students are not included in the analyses for the given semester.

Measures

Student mobility is measured for each of the semesters beginning in the spring of 2003. Test data from each of the three subject areas are used to improve the accuracy of student movement with respect to the school the student attended prior to changing schools. For example, if students were missing math assessment data, but had either reading or language arts data, they are coded as being in the school where they took the other subject area test. Additionally, NWEA test data from private and alternative schools not included in the analyses are used to determine the school students attend when public school test scores are missing. If

the student still misses a school identifier, but appears again no more than four semesters later, the student is assumed to have stayed in the same school until the later test date shows a new school. Students missing three or more semesters of data between testing points are presumed to have moved between the two tests. If the student is missing a test date and does not show up in a later semester, then the student's movement pattern ends with the last test date available. The design of the mobility variable accommodates schools that may have consolidated, bringing two schools together as one (e.g., separate elementary school and junior/senior high school that consolidate into one K-12 school). Students who attend one of the pre-consolidation schools and then continue on in the consolidated school would look like they changed schools because of different school codes. However, students in these schools are not treated as movers.

Testing time points (*MONTH*) are included in the analyses to control for the variation in the test administration timing. For each of the eight semesters, the month in which a student took the NWEA test is recorded as the date of the test. A student can have up to eight testing points. The month count is one continuous count throughout the eight semesters starting with August 2002 = 0, increasing by one for each month, ending with May 2006 = 44. The increment of time selected for the testing date (e.g., month) becomes the increment over which we are measuring achievement growth.

The NCLB school choice provision stipulates that Title I schools identified for school improvement after failing to make AYP for two consecutive years must offer students the option to transfer to a school within the district that has not been identified for school improvement. In contrast to the legislative mandates of NCLB, the western state we examine is one of three states nationwide that allows any student who attends a school that failed to make adequate yearly progress for two consecutive years the option to transfer to a school within their district,

regardless of whether the school receives Title I funding. States first measured AYP status under NCLB at the end of the 2002-03 school year. While states could use their determinations of AYP from the legislative mandates of the Improving America's Schools Act of 1994 to establish accountability mechanisms prior to 2002-03, most states have used 2002-03 as the first year for determining NCLB sanctions. Figure 1 demonstrates how AYP determinations are measured for one school year and applied in the following school year. For example, if a school did not make AYP in the 2002-03 school year, the school is identified as low-performing for the 2003-04 school year. If a school did not make AYP in either the 2002-03 or 2003-04 school years, the school had to offer choice to students for the 2004-05 school year.

School-level AYP data for the 2002-03, 2003-04, and 2004-05 school years were obtained from the State Department of Education in the state. In this western state, 216 schools failed to make AYP in 2002-03, 113 failed to make AYP in 2003-04, and 259 failed to make AYP in 2004-05. Based on school AYP determinations, we calculate that after the first two years of NCLB, 80 schools had not met AYP for two consecutive years. At the end of the third year of NCLB, 99 schools had not met AYP for at least two consecutive years. Although we cannot identify the exact students who moved from a school that must offer choice to a higher performing school because of the NCLB choice provision, we can examine students who change schools and model the behavior supported by the NCLB school choice policy. Our analysis focuses on students who move from schools that must offer choice to schools that are not identified as in school improvement status. Students who make policy relevant moves will be compared to a group of students that start out in a school that must offer choice but do not make a policy relevant move to a higher quality school.

In order to capture the type of student mobility relevant to the NCLB school choice policy, we create a dummy variable that indicates the school change pattern consistent with NCLB choice policy (*NCLB CHOICE MOVE*), disallowing moves that are structural promotions or moves to another school district. Structural promotion (e.g., changing schools from an elementary school to a middle school or from a middle school to a high school) is determined by comparing the student's spring grade level plus one to the highest grade level offered in that school. If the student's grade level plus one is greater than the highest grade level offered, the student is coded as a structural mover for the subsequent fall semester (or spring semester if the fall test score is missing). Students who move to a school outside of their district, even if the move is from a school that must offer their students choice to one that can accept choice students, the inter-district move does not conform to the NCLB school choice policy and the student's move is not considered a policy relevant move. However, inter-district moves to a charter school are treated differently. Some of the state's charter schools are their own local education agency, rather than part of a traditional public school district. Additionally, for charter schools located and operated in a traditional school district, eligibility to attend the charter school may not be restricted to students in their district. For these two reasons, a move to an in-state charter school is treated as an intra-district move.

Students in our sample must attend a school that must offer choice in at least one semester for the policy relevant group and two semesters for the comparison group between the fall of 2003 and the spring of 2006. To identify schools that must offer choice under NCLB, we first use the annual school-level AYP determinations from 2002-03, 2003-04, and 2004-05. We create an AYP choice dummy variable for each school that indicates whether the school must offer choice after failing to make AYP for two consecutive years. Schools that must offer choice

retain that status until they meet AYP for two consecutive years. Schools that consecutively failed to make AYP in 2002-03 and 2003-04 are given the choice dummy variable for fall 2004 and spring 2005. Schools that failed to make AYP for at least two consecutive years in 2002-03, 2003-04, and 2004-05 are given the choice dummy variable for fall 2005 and spring 2006. We then use the school-level AYP choice dummy variables to create student-level NCLB choice pattern variables for each of the four semesters after the NCLB choice provision began, beginning in fall 2004. In order to create these student mobility patterns between schools that must offer choice and schools that can accept students, we artificially assign the choice status to schools for the two semesters prior to the schools actually having to offer choice. For example, even though schools that failed to make AYP in 2002-03 and 2003-04 would not be required to offer choice until the summer after the 2003-04 school year, we apply the choice status to schools in fall 2003 and spring 2004 so that we can measure students who move from these NCLB choice schools to higher performing schools for the 2004-05 school year. In turn, the NCLB choice pattern variables are a set of dummy variables that describe the NCLB choice status of the school the student attends in the semester tested and the choice status of the school the student attended the semester before. There are four patterns of school NCLB choice status, measured by four dummy variables:

- Student previously attended a school that must offer choice, currently in a school that must offer choice (Low Low)
- Student previously attended a school that must offer choice, currently in a school that does not have to offer choice (Low High)
- Student previously attended a school that did not have to offer choice, currently in a school that does not have to offer choice (High High)
- Student previously attended a school that did not have to offer choice, currently in a school that must offer choice (High Low)

In effect, the NCLB choice pattern variables allow for the use of natural variation in student mobility to pinpoint policy relevant behavior. Moves that follow the Low High pattern are the policy relevant moves, named NCLB Choice Move in the models below.

Students who make NCLB policy relevant moves meet the following set of requirements. The students have at least two test scores between the 2003-04 school year and spring 2006 so that the change between schools can be observed. The students move from schools identified as having to offer choice under NCLB to schools that can accept students because the schools have not been identified for school improvement. The move from one school to another between semesters is not considered a structural promotion. And finally, the change of schools is not to another school district. We will compare the NCLB policy relevant group of students to students who attend schools that must offer choice but do not make the policy relevant move. In effect, students in the comparison group have the same opportunity to transfer to a higher performing school in the district but do not make the move during the study time period. Students remain in the comparison group after they attend a school that must offer choice for two semesters, regardless of structural or inter-district moves that may occur after that time.

Students in the policy relevant group are coded with a 0 for the NCLB Choice Move until the semester they make the move and then coded 1 for all subsequent semesters in the first level of the model. This coefficient will give us the bump in achievement at the testing point that students make the policy relevant move. We measure the number of months after students make the policy relevant move with a measure similar to the month count (*NCLB CHOICE MOVE DURATION*). The duration variable is designed to capture policy relevant moves that take place starting with the change of schools between the spring and fall of 2004; the point at which students could begin to transfer schools using the NCLB school choice provision. The variable

is coded as zero until a student makes a policy relevant change in schools. When the student changes schools, the duration begins counting the number of months in the school based on the testing date for the first semester in the new school. For example, if a student moves into a new school in the fall of 2004 and is tested in October 2004, the duration variable will be four because students began testing in July 2004 for the fall 2004 semester. The duration count will continue to grow with each testing season, provided the student remains in the NWEA database. We also created a duration squared variable to allow for non-linear growth after making the policy relevant move. However, model comparisons of fit analyses with deviance statistics indicate that including the duration squared variable does not improve model fit. The NCLB duration coefficient will give us the change in the growth rate after a student makes the policy relevant move. The longitudinal coding of the treatment move and duration after treatment follows the theoretical assumptions of the NCLB policy that the move will have compensatory effects that should continue even if the student makes subsequent moves. A time invariant treatment group dummy variable is also applied to the policy relevant students in the second level of the model (*NCLB*). Students in the comparison group are coded as 0 for the Low High move for all semesters in the study.

The NWEA database does not contain a large quantity of student-level demographic information. NWEA requires that schools and districts report data on student gender and race/ethnicity. *MALE* is coded 1 for if a student's gender is male. We collapse the measure for race/ethnicity into *OTHER RACE* equals 1 and White equals 0, given the student population in the state we analyze is 83% White. NWEA requests, but does not require, that schools and districts report data on student eligibility for free or reduced price lunch, special education designation, and English language learner status. Consequently, the frequency and method of

reporting these non-required student-level measures varies too much across the data to be deemed reliable for inclusion in our analyses. Due to the limited nature of the student-level demographic data, we use a measure for prior achievement to capture unobserved student characteristics. *PRIOR ACHIEVEMENT* is taken from the first semester the student is tested by NWEA in reading for the mathematics outcome models and in mathematics for the reading outcome models. If the opposite subject area test is not available in the first semester the student is assessed, we first look for a test score in the semester prior and then we use a test score if available in the semester after. We use a test score from a semester earlier for three students in math and one student in reading that did not have the other subject area test available for the first semester they were assessed. We use a test score from a semester later for one student in math and two students in reading that did not have earlier scores available in the other subject area. Students without prior test scores are not included in the analysis. Dummy variables for the student's grade level for each semester tested are included (*GRADE*). NWEA tests students in grades two through ten. Because the difference between achievement levels is non-linear, dummy variables for the student's grade allow us to estimate non-linearity in the models. Additionally, we include an interaction between grade level and month growth rate to address non-linear achievement growth across grade levels (*GRADE*MONTH*).

From our calculations of student mobility, we are able to add several extra student-level variables to the models. First, we create a continuous variable, *MOVE COUNT*, that counts the number of moves a student makes over time, excluding structural moves, for the first level of the model. This measure allows us to examine how student movement, whether policy relevant or not, and in particular, multiple moves for highly mobile students impact achievement growth. The move variable is a continuous count of moves incrementally over time. We also create a

variable (*MID-YEAR MOVE*) that indicates whether the move was a mid-year change in schools (e.g., between fall and spring semesters). Given the student mobility literature, it is assumed that a mid-year move could impact students' achievement growth differently than if the student waited until the end of the school year to change schools.

Students in the NWEA database are linked to the school where they are tested. The NWEA school codes are linked to National Center for Education Statistics (NCES) school identification numbers that we use to merge with school-level Common Core of Data (CCD) for the four academic years of the study (National Center for Education Statistics, 2007b). The CCD charter school status variable is used to control for difference in school types (*CHARTER*). We use the CCD variable for locale to create dummy variables indicating if the school is an urban, suburban, or rural school. The urban dummy variable is created by combining the two CCD categories of schools in large cities and mid-sized cities. Suburban is created by combining the two categories of schools in the urban fringe of large cities and the urban fringe of mid-sized cities (*SUBURB*). Rural schools include schools categorized as being located in large and small towns and schools in rural areas (*RURAL*). We include the CCD variables for pupil/teacher ratio (*PUPTCH*) and school size (*ENROLLMENT*). We calculate the percentage of high poverty students in the school by dividing the number of students eligible for free or reduced price lunch by the number of students enrolled in the school (*%FRL*). Finally, we calculate school-level racial/ethnicity percentages. However, we are unable to include these school-level variables in the second level of the models along with the student race/ethnic variable due to the high levels of multi-collinearity between these student and school measures.

Our study includes achievement data for 62,628 students in the western state that attended a school that must offer choice in our sample period (29,164 students who did not have

at least two valid test scores were excluded). Test scores for semesters spent in a school out of the state and alternative schools are not used in the analysis, regardless of their choice status.

Analytic Models

Several unconditional and conditional models were built and compared using deviance statistics to determine the best fit of the data (Singer & Willett, 2003). Here, we report on three stepwise models for each of the two dependent variables, mathematics and reading, with our final model based on the strength of fit. In the first step, the dependent variable is modeled as a function of the test time point indicator to determine that both the initial status and growth parameters are statistically significant. The second step adds the level-1 time varying covariates, including the NCLB Choice Move treatment dummy variable. In the third step, student- and school-level time-invariant covariates are added as regressors on the intercept and the growth rate in the second level of the model. All of the variables included in the models are un-centered since the value of zero for every variable has substantive meaning, except prior achievement which is added grand mean centered. The model is run using a cumulative specification (Raudenbush & Bryk, 2002). At level one of the final model, each student's achievement is represented by an individual growth trajectory:

$$\begin{aligned} Achievement_{jt} = {} & \pi_{0jt} + \pi_{1jt}(\text{Month}) + \pi_{2jt}(\text{NCLB Choice Move}) \\ & + \pi_{3jt}(\text{NCLB Choice Move Duration}) + \pi_{4jt}(\text{Move Count}) \\ & + \pi_{5jt}(\text{Mid-Year Move}) + \pi_{6jt}(\text{Grade}) + \pi_{7jt}(\text{Grade*Month}) + e_{jt}, \\ & e_{jt} \sim N(0, \sigma^2), \end{aligned} \tag{1}$$

where $Achievement_{jt}$ is the expected mathematics or reading outcome and t denotes the time elapsed in months since the month student j was first tested. The initial status and growth trajectory parameters for student j are π_{0jt} and π_{1jt}. We can interpret π_{0jt} as the initial status of

achievement for student *j* and π_{1jt} as that student's average growth rate in achievement per month over four school years. The NCLB Choice Move is interpreted at the bump in achievement that occurs when a student makes the policy relevant move. The NCLB Choice Move Duration measures the number of months after a student makes the policy relevant move and can be interpreted as the average growth rate associated with the policy relevant move. NCLB Choice Move Duration must be interpreted in tandem with the overall average growth rate represented by Month. Lastly, e_{jt} is a random within-subject residual assumed to be normally distributed with a mean of 0 and a variance of σ^2.

The level-2 equations of the model include time-invariant covariates for the row and column portions of the model. The row variables are student time-invariant covariates. The column variables are school time-invariant covariates (though schools have unique identifiers for each semester which allows their characteristics to vary over time for students who remain in a school over multiple time points). We will add row and column predictors to the initial status and growth rate equations in level-2. We assume that only the initial status of achievement varies across individuals, represented by the following final level-2 equations:

$$\pi_{0jt} = \theta_0 + b_{00j} + \sum_{k=1}^{K} \sum_{h=0}^{t} D_{hjk} c_{00k} \qquad (2)$$

$$+ \gamma_{01}(\text{Male})_j + \gamma_{02}(\text{Other Race})_j + \gamma_{03}(\text{Prior Achievement})_j + \gamma_{04}(\text{NCLB})_j$$

$$+ \beta_{01}(\text{School Choice})_k + \beta_{02}(\text{Rural})_k + \beta_{03}(\text{Suburb})_k + \beta_{04}(\text{Charter})_k$$

$$+ \beta_{05}(\text{PupTch})_k + \beta_{06}(\text{Enrollment})_k + \beta_{07}(\%\ \text{FRL})_k ,$$

$$\pi_{1jt} = \theta_1$$

$$+ \gamma_{11}(\text{Male})_j + \gamma_{12}(\text{Other Race})_j + \gamma_{13}(\text{Prior Achievement})_j$$

$$+ \beta_{11}(\text{School Choice})_k + \beta_{12}(\text{Rural})_k + \beta_{13}(\text{Suburb})_k + \beta_{14}(\text{Charter})_k$$

$$+ \beta_{15}(\text{PupTch})_k + \beta_{16}(\text{Enrollment})_k + \beta_{17}(\%\ \text{FRL})_k ,$$

$$\pi_{2jt} = \theta_2 ,$$

$$\pi_{3jt} = \theta_3 ,$$

$$\pi_{4jt} = \theta_4,$$

$$\pi_{5jt} = \theta_5,$$

$$\pi_{6jt} = \theta_6,$$

$$\pi_{7jt} = \theta_7,$$

$$b_{100j} \sim N(0, \tau_{b00}),$$

$$c_{100k} \sim N(0, \tau_{c00}),$$

where θ_0 represents the mean initial achievement status and θ_1 represents the mean achievement growth rate across students. After the student-level row components are controlled for, such as gender, race/ethnicity, prior achievement, and the NCLB treatment group indicator, b_{00j} is the residual random effect associated with student *j* on achievement. The random school effect for achievement is c_{00k}. $D_{tjk} = 1$ if student *j* attends school *k* at time *h* and otherwise, $D_{tjk} = 0$ with the double summation cumulating the school effect c_{00k} over time. The school-level residual random effect is the expected deflection in the initial status associated with attending school *k* after school-level covariates are accounted for in the model. The row-level indicators include the dummy variables for male and other race/ethnicity. Additionally, the student-level row measures include prior achievement and a time invariant dummy variable for treatment group students, regardless of when they make the move. However, the dummy variable for the treatment group is only included as a predictor of the intercept. This variable will allow us to determine if students who make policy relevant moves are different from the comparison group on initial status to control for some of the selection bias. The column-level measures include a dummy variable indicating whether a school has to offer choice under NCLB and dummy variables for the locale of the school (with urban schools omitted) and charter school status. We include three continuous school-level variables, including the pupil/teacher ratio, the number of students enrolled, and the percentage of the school population that is eligible for free or reduced price lunch.

Propensity Score Matching

There are several reasons for using NWEA data to evaluate NCLB school choice policy relevant movement in the western state we examine in this paper. First, the state used the NWEA assessment to calculate whether schools made adequate yearly progress under NCLB for the years in this study. Furthermore, the entire student population of the western state is assessed by NWEA for the four years in the study and test scores can be tracked longitudinally. As a result, we can make use of natural variation in student behavior to examine students who make policy relevant moves and compare them to students who attend schools that must offer choice but do not make a policy relevant move during the study.

However, because we make use of natural variation of student behavior to examine the NCLB school choice policy, the presence of treatment selection bias must be addressed. Therefore, in addition to modeling the impact of NCLB movement with the entire set of students who meet the requirements of our policy relevant and comparison groups, we conduct propensity score matching at the student level to create a matched comparison group with refined parameters for a second set of analyses that will allow us to test the robustness of our overall findings (Dehejia & Wahba, 2002; Rosenbaum & Rubin, 1984). Propensity score matching in this study uses sample stratification and relevant student and district information to predict the probability that a student is a NCLB policy relevant mover (Berends, Stein, & Nicotera, 2007). As mentioned previously, the student demographic data available from NWEA is limited. We are only able to use student gender, race, and prior achievement in the propensity score matching. However, the sample stratification and district information used in the process allows us to refine our comparison group to serve more closely as a counterfactual to the NCLB school choice treatment.

For the propensity score matching, students are first stratified into five cohorts based on the first time that they attend a school that must offer choice. Each cohort represents these students by semester, beginning in Fall 2003. Within the semester cohorts, we restrict students to those who have both math and reading RIT scores present so that we will have prior achievement scores for both subject areas. We then stratify the semester cohorts by grades two through ten. Within each grade level, students who are not identified as a NCLB policy relevant mover are restricted to those who attend school in a district where there is at least one other school they could move to in the next grade level. We use this restriction because there are two situations in which a student may attend a school that must offer choice under NCLB, but the student is not actually able to transfer to another school within the district. The first situation occurs when the district is small and there are no other schools in the district that offer the grade level. The second situation occurs when the district has other schools that offer the grade level, but all of the other schools must also offer choice under NCLB. As a result, our restriction that the student must attend a school in a district where the student could actually move generates a matched comparison group where the opportunity to transfer schools is available to both the policy relevant students and the comparison group students.

A propensity score is generated for all students within each cohort and grade level by estimating a probit regression model that is conditional on student observed characteristics, represented by the following equation:

$$\Pr(S_j) = \beta_0 + X_j\beta_k + e_i,$$

where X is a vector of k observable characteristics of student j, predicting a probability of student j being a NCLB policy relevant mover. The student observable characteristics include gender, the student's race/ethnicity (White, Hispanic, Black, or Native American, with other omitted),

and prior achievement (math for the reading sample, and reading for the math sample). Additionally, several district characteristics obtained from the CCD are included to capture unobservable differences between students based on where they attend school, such as the number of students enrolled in the district, the number of schools in the district, the number of students classified as special education and English Language Learners, and the locale of the district (rural and suburb, with urban omitted) (National Center for Education Statistics, 2007a). Students are dropped from the sample if their observable characteristics perfectly predict classification in either group.

The predicted probability of being a NCLB policy relevant mover obtained from the estimation is the propensity score for each student. A distance score ($d_{ij} = | p_i - p_j |$) is computed for each NCLB policy relevant student (i) and comparison student (j) and then each policy relevant student is matched to a comparison student who minimizes d_{ij}. Using nearest-neighbor matching with replacement, the comparison group students are allowed to match to multiple NCLB policy relevant students to maximize the number of policy relevant students retained in the sample. In order to ensure that that the match on d_{ij} is sufficiently close, a caliper of less than .01 that defines the acceptable distance between groups is applied. We use the sample of policy relevant and comparison students retained from this propensity score matching process in the cross-classified random effects growth models to test the robustness of our findings.

Results

Descriptive Results

Table 1 presents proficiency levels, or RIT mathematics cut scores, for each of the grade levels tested in the western state by NWEA as the state standards assessment. From the mean

grade level math RIT scores reported in Table 2, scores for students in the NCLB policy relevant group in grades two through four and nine and scores for students in the comparison group in grades two and nine fall below the math proficiency level, while mean RIT scores in the other grades are above the proficiency level. For the mathematics propensity score sample presented in Table 3, mean grade level RIT scores for grades two, three, and nine in both the policy relevant group and the comparison group fall below the proficiency level, while all other grades are above the proficiency level.

In the overall mathematics sample (Table 2), there are 2,246 students with 15,574 testing time points who made the NCLB school choice policy relevant move during the 2004-05 and 2005-06 school years. In comparison, there are 62,312 students with 422,195 testing points who attend a school that must offer choice but do not make a policy relevant move during the study period. The mean difference between students in the policy relevant group and the comparison group is statistically significant for many of the student-level variables included in the model, except the difference in the number of test scores, the percentage of the sample that is male, and the percentage of the sample that are not white students.

In the math propensity score matched sample (Table 3), there are 1,646 NCLB policy relevant students matched with 1,364 comparison group students. Based on our propensity score specifications, comparison group students could be matched with more than one policy relevant group student. While the students in the policy relevant group do not differ significantly from students in the comparison group on observable characteristics such as prior achievement, gender, or race/ethnicity, there are mean differences that are statistically significant between students in this sample. Descriptive statistics for the reading sample are reported in Appendices

A and B. In general, the differences between groups are similar to those of the mathematics sample.

School-level descriptive statistics are presented in Table 4 for the overall sample and in Table 5 for the propensity score matched sample. The school samples are the same for both the reading and math samples. Students are eligible for inclusion in our analysis if they attend schools that must offer choice under NCLB. Schools that do not have to offer choice are the schools where the policy relevant students may move to and thereby make the policy relevant move. In the overall sample, 75 of the 80 schools in the western state that must offer choice in 2004-05 and 93 of the 99 schools that must offer choice in 2005-06 remain in our sample after students are restricted based on our sample decision rules. A majority of schools that must offer choice in the state are located in rural areas. When the propensity score matching restriction that students must attend school in a district where choice is actually available is applied, the number of rural schools drops because many of the affected schools are in small districts.

In the overall sample, schools that must offer choice under NCLB have higher percentages of students eligible for free or reduced price lunch, larger school enrollment, but smaller pupil/teacher ratios than schools where students may transfer. These patterns are the same for the propensity score matched school sample. This difference in characteristics is of particular note since the state analyzed here does not restrict the ability to move the policy relevant move to only Title I schools, as is designed in NCLB.

Results from Cross-Classified Models

The three stepwise models for the overall and the propensity score math samples are reported in Table 6 (see Appendix C for the reading models). Model 1 is an unconditional model that examines whether initial status and growth rates in mathematics achievement vary across

students. Both the initial status and growth rate parameters are statistically significant and the χ^2 statistics for row level and column level variance components lead us to reject the null hypotheses and conclude that students vary significantly in their initial level of mathematics achievement. Model 2 is also an unconditional model with time varying student-level covariates added at level-1. Similar to Model 1, the initial status and growth rate coefficients are statistically significant and the row and column variance components indicate that there is variability across students. In the overall math model, all of the level-1 variables are statistically significant except for the duration variable measuring the achievement growth rate attributable to a policy relevant move. However, when we conducted comparison of fit analyses between several models, the models that include duration as a control fit the data better than when the variable was excluded. Given the variability in initial status and learning rates between students, we add level-2 student and school covariates to the initial status and growth rate parameters in the conditional Model 3.

In the final model, Model 3, controlling for other student demographics, , students in the sample who start out in a school that must offer choice under NCLB have significantly lower initial achievement than students who start out in the study in a school that has not been identified as having to offer choice. Because NCLB choice policy did not take full effect until fall 2004, only students in choice schools from fall 2004 and later were used in the estimation of this coefficient. Students whose initial status in schools that later were required to offer choice but before fall 2004 are in the reference group for this coefficient.

In addition, Model 3 reveals that white students have statistically significant higher initial achievement than non-white students, and males have significantly higher initial achievement than females. Moreover, students with higher prior test scores in reading have higher initial

achievement in math. Students who attend suburban schools compared to urban students, students in schools with higher percentages of free or reduced price lunch eligible students, and students in schools with higher teacher/pupil ratios have higher initial achievement, while students who attend charter schools have lower initial achievement than students in traditional public schools. Students in rural schools do not differ significantly from urban students. Students who will eventually make a NCLB policy relevant move have lower initial achievement status than students who do not make the move.

In the overall math sample, the mean growth rate (0.659) is for students in the third grade (the omitted grade level). Calculating the mean growth rate for each grade level requires adding the mean growth rate coefficient with the grade and growth rate interaction coefficient. By taking the average of these calculations for all grades, students on average learn at a rate of 0.440 RIT points per month. Expected growth rates vary across the grades (see Table 1) and in our findings range from a minimum of 0.203 points per month in ninth grade to a maximum of 0.659 points per month in third grade. Male students and students in schools that must offer choice have faster achievement growth rates than female students and students not attending a choice school, respectively. Slower growth rates were found among students with higher prior achievement, in schools in rural or suburban areas compared to urban locales, in larger size schools, and in schools with higher percentages of students receiving free or reduced price lunch.

If we assume nine months for an academic year, students in our sample average 5.931 RIT points growth per year, across all grades, controlling for all level-two growth predictors. Depending on grade level, proficient students are expected to increase RIT scores from 2 to 11 points per year, with an average increase of 7.125 points (see Table 1). Most students in our

sample attend schools that are not meeting proficiency standards, with an increase in RIT points that is below the average expected across grades.

For the NCLB school choice policy to have the intended effect of increasing student performance when students are allowed to move to a higher quality school, the NCLB Choice Move coefficient must be positive and relatively large in magnitude to give students a positive bump in achievement level to reach or exceed proficiency, assuming the same growth rate in the future. Another possibility, with or without the NCLB Choice Move impact, is if the NCLB duration coefficient is positive and exceeds the magnitude of the growth rate so that the student's learning rate could catch up to the proficiency level over an academic year or two. However, the results of our models indicate that neither of these scenarios is likely to take place.

The NCLB Choice Move coefficient is -0.660 and must be interpreted in tandem with Move Count coefficient (-0.413). If the NCLB policy relevant move is the first move the student makes in the study, the impact of that move for the average student is -1.073 points (-0.660 plus 1 times -0.413). If the student is highly mobile, the negative impact of the policy move continues to increase with each additional move. Our results correspond with the student mobility literature that predicts a disruptive impact to academic achievement when students make non-structural changes in schools.

The NCLB duration coefficient is positive and statistically significant, which indicates that after students make the policy relevant move, they may receive a small but positive boost in their growth rate. However, the positive increase in the growth rate a student receives in very small (0.038 points per month) compared to the negative impact associated with the move. With this increase in the growth rate, it would take a student making the policy relevant move 28.24 months to compensate for the negative impacts of the move. In addition, the slower growth rates

of students in high poverty schools and non-urban schools may provide an even more difficult path for many of the students the policy is aimed to assist. A finding counterintuitive to the design of the NCLB move policy is that students who stay in the lower performing schools not only avoid the negative achievement bump of the move but their achievement grows at a faster rate than students who have moved out of the lower performing school.

Results from the overall math sample are generally consistent with the propensity score math sample. The NCLB policy relevant move has a coefficient of -1.826 (-2.145 when added to the move count for one move) in the propensity score model. The NCLB duration, which is statistically significant, contributes 0.166 points per month or 1.494 additional RIT points over an academic year, which is not large enough to counter the negative impact of the policy relevant move. Results from the overall reading sample show a coefficient of -0.553 for the NCLB move with a positive coefficient on move count (0.109) and a negative, but statistically insignificant coefficient for duration (-0.005). In the reading propensity score analysis the coefficient on move count is also positive, but not statistically significant. For the reading propensity score sample, the NCLB move coefficient is -1.604 and the duration coefficient is 0.102.

Discussion

Although the NCLB school choice policy is intended to provide parents and their children the option to attend higher performing schools, the evidence to date suggests that this provision is not utilized on a wide scale when there are schools to choose from nor implemented in a large number of small districts where choice does not exist. Over time, perhaps more eligible students will have and utilize this choice, but given the current barriers of viable school options and the reluctance of parents to actually transfer their children to a new school, it is

doubtful whether the transfer option under NCLB will be widely used across the United States. Even if students make these transfers, the evidence provided here from a western state suggests that students may not benefit in their academic performance if they make the choice.

Our models suggest that students who move from persistently low-performing schools that must offer choice under NCLB to higher performing schools in the district experience initial negative bumps in achievement levels that are not compensated for with the small boost in achievement growth in the higher quality school over an academic year. Additionally, students who opt to not make the NCLB choice move have faster achievement growth rates than students who make the policy relevant move. There are several limitations to our findings that must be acknowledged. Although we have the entire student population of a western state and the assessment that the state uses to calculate school-level adequate yearly progress in reading and math, the sample is not representative of the nation as a whole. Additionally, our models of student movement between low-performing and higher performing schools are merely proxies for the NCLB transfer option. Chance or improvements in family conditions are two possible conditions explaining the movement from a low-performing school to a higher performing school apart from NCLB policy.

The theoretical assumptions and legislative mandates of the NCLB school choice policy also create limitations to the findings. School quality under NCLB is measured by adequate yearly progress, which takes into account aggregate student achievement and disaggregated subgroup achievement, as well as testing participation rates and graduation rates. Only the aggregate school level measurement of AYP was used for this study, without sub-analyses of why the school did not meet AYP. If the NCLB measure of overall school quality does not

accurately identify higher quality schools, we would not expect students to increase in student performance if they make the policy relevant move.

We conduct school-level logit models to address the questions of whether school-level achievement significantly predicts whether schools fail to make AYP or have to offer choice under NCLB in the sample. Understanding that schools may fail to make AYP because of participation rates or graduation rates, the models examine the extent to which higher quality schools, as measured by school-level achievement, predict a school's policy designation. Specifically, the models examine three years of school-level AYP determinations and two years of NCLB choice status regressed on school-level characteristics. In the first panel of Table 7 we examine school-level predictors of a school making AYP under NCLB. Controlling for school size, percent of students eligible for free or reduced price lunch, pupil/teacher ratio, percent of white students, rural location, the grade configuration, and year dummies, the standardized average test score for both math and reading is a positive and statistically significant predictor of making AYP. Figure 2 presents the predicted probability of making AYP across school-level average math achievement and shows a positive relationship with a relatively tight confidence interval. The second panel of Table 7 examines the same set of school-level predictors on whether a school has to offer choice under NCLB. In contrast, average achievement at the school-level in both math and reading is not a statistically significant predictor of having to offer choice, controlling for school-level characteristics. The wider confidence interval for higher levels of math achievement in Figure 3 indicates that there is wider variability between schools in terms of average achievement and having to offer choice than there is between achievement and AYP. There are some clear policy reasons for this disparity such as the requirement that schools must meet AYP for two consecutive years to be relieved of the choice requirement.

However, relevant to this study's findings, is the notion that a school offering choice and a school receiving choice students may not be very different since achievement tracks choice more loosely than achievement tracks AYP. Based on the western state considered here, students who make a policy relevant move from a school that has to offer choice may or may not end up in a higher quality school based on school-level achievement. In fact, students may end up in a school with the same or lower achievement level than the school that they left. This relative lack of difference in school quality may provide a partial explanation for the underutilization of the NCLB school choice policy and may shed light to the numerous factors shown empirically in our models of a negative achievement bump and slower achievement growth which are triggered when a student makes the NCLB choice move.

Based on our results, the compensatory goals of the NCLB school choice policy does not appear to work as intended in the western state we analyze. The underutilization of this policy by parents and their children may be in the child's best interest if these results were to play out on a larger scale across the country. Students who do make the NCLB choice move are not served well by the school transfer. The interaction of non-mobility with enhanced services like the supplemental educational services that are required for the third year of not meeting AYP should be explored to determine if that strategy is a better mechanism for improving students' outcomes than the choice move. With more time under the NCLB rules, it may be that the durational effect will grow larger. While our models that included duration-squared did not find an acceleration in achievement growth associated with how long ago the student made the NCLB change, this could change if some of the negative impacts we have detected are associated with the early stages of NCLB implementation. An examination of more states over more time may help paint a clearer picture of the successes and problems within NCLB school choice policy.

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Figure 1. Application of AYP Status and School Choice Provision under NCLB

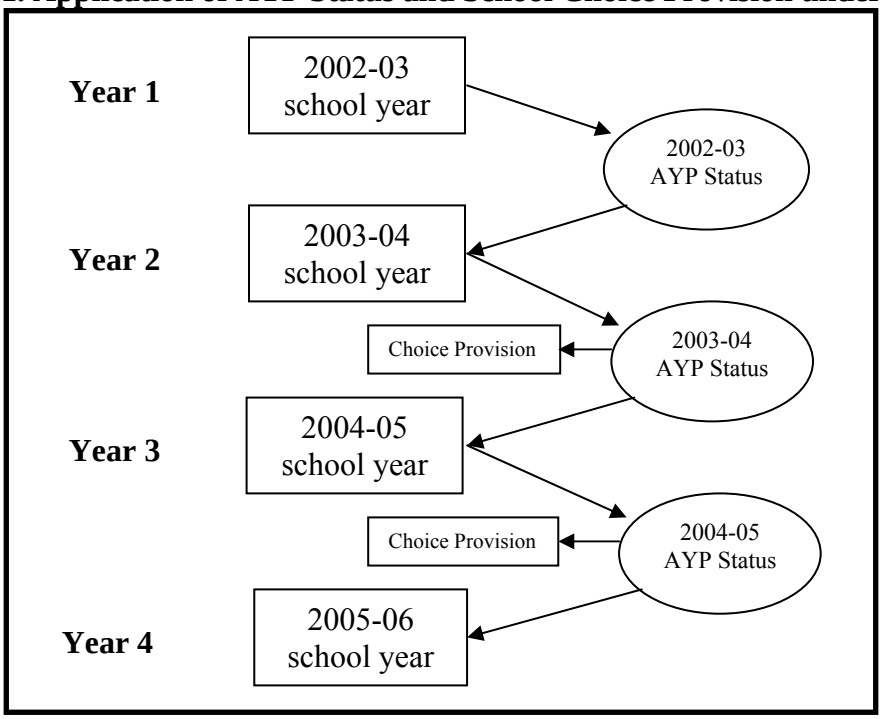

Figure 2. Probability That a School Will Make AYP Based on School-Level Math Achievement

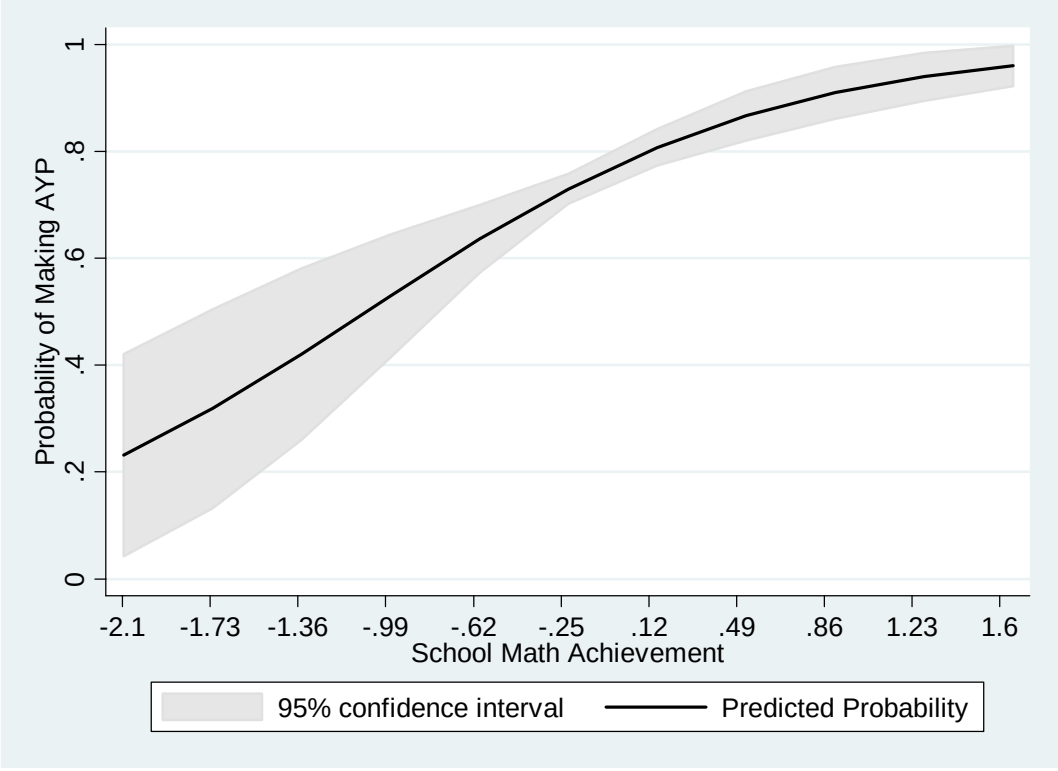

Figure 3. Probability That a School Will Have to Offer Choice Based on School-Level Math Achievement

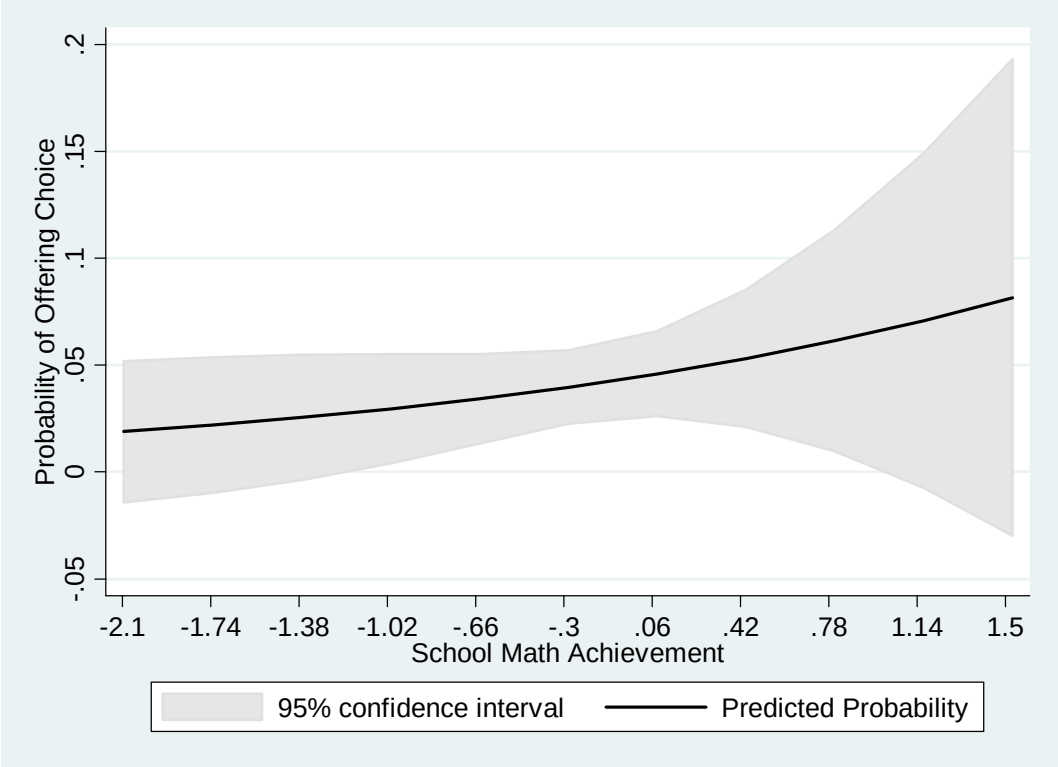

Table 1. NWEA Proficiency Levels for Math Standards-Based Assessments

	Grade Level								
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Basic	174	185	194	202	208	214	222	229	231
Proficient	185	196	205	213	219	225	233	240	242
Advanced	201	212	221	229	235	241	249	256	258

Table 2. Student Descriptive Statistics, Mathematics

	NCLB School Choice Policy Movers					Students Who Attend Schools That Offer Choice					
	N	Mean	Std Dev	Min	Max	N	Mean	Std Dev	Min	Max	Mean Diff.
Math RIT Score	15,574	223.52	18.92	138.61	292.90	422,195	225.27	18.82	132.34	314.17	- 1.75***
Grade 2	337	182.47	11.86	138.61	215.08	5,581	184.81	12.94	144.37	229.56	- 2.34***
Grade 3	455	194.48	11.92	160.01	230.76	14,216	196.50	12.45	142.10	245.43	- 2.02***
Grade 4	873	204.67	12.13	160.86	238.79	31,751	207.37	12.57	146.06	262.74	- 2.70***
Grade 5	2,037	213.24	12.54	167.53	251.18	52,699	214.53	13.41	152.97	268.30	-1.29***
Grade 6	2,959	220.06	14.12	162.01	262.06	74,832	221.57	14.11	147.62	278.21	- 1.51***
Grade 7	3,516	226.71	14.64	163.93	275.23	84,001	227.87	14.70	146.06	295.12	- 1.16***
Grade 8	3,056	233.06	15.28	157.20	289.94	75,561	233.71	14.98	153.03	314.17	- 0.65***
Grade 9	1,647	235.92	16.59	163.05	285.54	54,501	237.34	16.03	132.64	310.59	- 1.42***
Grade 10	694	243.23	15.36	174.11	292.90	29,053	243.51	14.56	158.35	301.05	- 0.28*
Grade 2 * Month	15,574	0.40	3.15	0	44	422,195	0.28	2.90	0	44	0.12***
Grade 3 * Month	15,574	0.69	4.59	0	44	422,195	0.41	3.14	0	44	0.28***
Grade 4 * Month	15,574	0.89	4.96	0	44	422,195	0.93	4.24	0	44	- 0.04***
Grade 5 * Month	15,574	1.57	5.69	0	44	422,195	2.07	6.69	0	44	- 0.50***
Grade 6 * Month	15,574	3.23	8.07	0	44	422,195	3.73	9.63	0	44	- 0.50***
Grade 7 * Month	15,574	5.35	11.35	0	44	422,195	4.82	11.23	0	44	0.53***
Grade 8 * Month	15,574	6.05	13.08	0	44	422,195	4.71	11.34	0	44	1.34***
Grade 9 * Month	15,574	3.61	10.81	0	44	422,195	4.04	11.02	0	44	- 0.43***
Grade 10 * Month	15,574	1.70	7.96	0	44	422,195	2.44	9.14	0	44	- 0.74***
NCLB duration	15,574	3.82	6.37	0	23	422,195	0	0	0	0	--
Move count	15,574	0.63	0.79	0	6	422,195	0.19	0.48	0	5	0.44***
Mid-year move	15,574	0.06	0.24	0	1	422,195	0.01	0.12	0	1	0.05***
Number of Tests	15,574	4.63	2.24	1	8	422,195	4.63	2.22	1	8	0.00
Prior Score, Read	2,246	205.10	18.61	140.37	252.52	62,312	206.64	18.25	130.55	260.63	- 1.54***
Gender (1 = male)	2,246	0.52	0.50	0	1	62,312	0.52	0.50	0	1	0.00
Other race	2,246	0.19	0.39	0	1	62,312	0.21	0.40	0	1	- 0.02

*** p<.001; ** p<.01; * p<.05

Table 3. Student Descriptive Statistics, Mathematics Propensity Score Sample

	NCLB School Choice Policy Movers					Students Who Attend Schools That Offer Choice					
	N	**Mean**	**Std Dev**	**Min**	**Max**	**N**	**Mean**	**Std Dev**	**Min**	**Max**	**Mean Diff.**
Math RIT Score	11,563	223.74	19.24	138.61	292.90	9,321	223.87	19.47	151.37	314.17	- 0.13*
Grade 2	273	182.84	11.73	138.61	215.08	219	181.68	12.49	151.37	212.05	1.16***
Grade 3	364	194.77	11.88	161.63	230.76	319	194.34	12.04	163.86	229.99	0.43
Grade 4	744	205.27	11.86	160.86	238.79	615	205.96	12.05	162.49	248.07	- 0.69***
Grade 5	1,481	213.52	12.65	167.53	245.63	1,242	214.23	13.11	159.06	250.96	- 0.71***
Grade 6	2,101	220.61	14.25	162.01	262.06	1,836	221.20	14.53	157.60	262.85	- 0.59***
Grade 7	2,617	226.89	14.85	163.93	275.23	2,037	227.58	14.95	161.72	274.38	- 0.69***
Grade 8	2,177	233.13	15.64	173.73	289.94	1,710	234.63	15.60	164.61	314.17	- 1.50***
Grade 9	1,221	237.25	16.05	183.37	285.54	976	237.36	16.74	174.08	288.81	- 0.11
Grade 10	585	244.20	14.60	192.31	292.90	367	244.11	13.96	187.17	276.63	0.09
Grade 2 * Month	11,563	0.45	3.35	0	44	9,321	0.46	3.43	0	44	- 0.01
Grade 3 * Month	11,563	0.74	4.75	0	44	9,321	0.76	4.73	0	44	- 0.02
Grade 4 * Month	11,563	0.95	5.03	0	44	9,321	0.96	5.04	0	44	- 0.01
Grade 5 * Month	11,563	1.64	5.75	0	44	9,321	1.71	5.87	0	44	- 0.07**
Grade 6 * Month	11,563	3.31	8.38	0	44	9,321	3.55	8.68	0	44	- 0.24***
Grade 7 * Month	11,563	5.29	11.45	0	44	9,321	5.40	11.50	0	44	- 0.11**
Grade 8 * Month	11,563	5.63	12.56	0	44	9,321	5.77	12.90	0	44	- 0.14**
Grade 9 * Month	11,563	3.55	10.63	0	44	9,321	3.63	10.90	0	44	- 0.08*
Grade 10 * Month	11,563	1.96	8.57	0	44	9,321	1.50	7.48	0	44	0.46***
NCLB duration	11,563	3.49	6.09	0	23	9,321	0	0	0	0	--
Move count	11,563	0.62	0.78	0	6	9,321	0.23	0.52	0	5	0.39***
Mid-year move	11,563	0.06	0.23	0	1	9,321	0.02	0.13	0	1	0.04***
Number of Tests	11,563	4.64	2.23	1	8	9,321	4.68	2.23	1	8	- 0.04*
Prior Score, Read	1,646	204.98	19.14	140.37	252.52	1,364	205.03	19.18	139.30	245.62	- 0.05
Gender (1 = male)	1,646	0.52	0.50	0	1	1,364	0.50	0.50	0	1	0.02
Other race	1,646	0.18	0.39	0	1	1,364	0.17	0.37	0	1	0.01

*** p<.001; ** p<.01; * p<.05

Table 4. School Descriptive Statistics

Schools That Must Offer NCLB Choice								
	Fall 2002	**Spring 2003**	**Fall 2003**	**Spring 2004**	**Fall 2004**	**Spring 2005**	**Fall 2005**	**Spring 2006**
Rural					60.00%	60.00%	59.14%	59.14%
Suburb					17.33%	17.33%	18.28%	18.28%
Charter					1.33%	1.33%	1.08%	1.08%
Pupil/ teacher ratio					17.71	17.71	17.53	17.53
Enrollment					702.48	702.48	706.18	706.18
Free & Reduced Lunch					45.02%	45.02%	44.16%	44.16%
Total N					**75**	**75**	**93**	**93**
Schools That Do Not Have to Offer NCLB Choice								
	Fall 2002	**Spring 2003**	**Fall 2003**	**Spring 2004**	**Fall 2004**	**Spring 2005**	**Fall 2005**	**Spring 2006**
Rural	59.57%	59.70%	62.73%	61.86%	57.84%	56.46%	68.62%	68.66%
Suburb	14.89%	14.50%	13.83%	14.23%	15.68%	16.10%	14.36%	12.90%
Charter	1.91%	2.56%	2.81%	2.89%	3.86%	3.96%	9.57%	8.76%
Pupil/ teacher ratio	17.48	17.56	17.65	17.76	18.05	18.11	17.96	17.85
Enrollment	414.05	409.41	429.91	434.75	423.46	441.21	482.03	464.33
Free & Reduced Lunch	41.50%	41.51%	41.08%	41.03%	41.94%	41.48%	40.15%	39.93%
Total N	**470**	**469**	**499**	**485**	**389**	**379**	**188**	**217**

Table 5. School Descriptive Statistics, Propensity Score Sample

Schools That Must Offer NCLB Choice								
	Fall 2002	**Spring 2003**	**Fall 2003**	**Spring 2004**	**Fall 2004**	**Spring 2005**	**Fall 2005**	**Spring 2006**
Rural					44.00%	44.00%	44.62%	41.27%
Suburb					22.00%	22.00%	23.08%	25.40%
Charter					0%	0%	0%	0%
Pupil/ teacher ratio					18.03	18.03	18.01	17.74
Enrollment					815.56	815.56	815.77	821.81
Free & Reduced Lunch					43.94%	43.94%	41.30%	41.88%
Total N					**50**	**50**	**65**	**63**
Schools That Do Not Have to Offer NCLB Choice								
	Fall 2002	**Spring 2003**	**Fall 2003**	**Spring 2004**	**Fall 2004**	**Spring 2005**	**Fall 2005**	**Spring 2006**
Rural	35.20%	36.82%	41.81%	38.46%	39.84%	37.50%	48.81%	50.96%
Suburb	21.60%	20.50%	18.97%	19.91%	19.51%	24.22%	19.05%	19.23%
Charter	1.20%	1.26%	3.02%	3.17%	8.94%	9.38%	21.43%	18.27%
Pupil/ teacher ratio	18.49	18.62	18.55	18.60	19.35	19.26	19.97	19.34
Enrollment	490.96	497.10	530.27	527.52	562.38	543.59	579.17	549.64
Free & Reduced Lunch	40.42%	41.05%	40.12%	39.79%	39.39%	38.84%	34.11%	35.62%
Total N	**250**	**239**	**232**	**221**	**123**	**121**	**84**	**104**

Table 6. Cross-Classified Random Effects Model of Mathematics Achievement Growth for Students

	Mathematics			Mathematics, Propensity Score Sample		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Fixed Effects						
Mean initial status, π_{0jk}	205.391*** (*.14*)	191.690*** (*.20*)	196.742*** (*.43*)	203.241*** (*.42*)	191.927*** (*.76*)	201.750*** (*1.52*)
Male, γ_{01}			2.179*** (*.07*)			2.225*** (*.36*)
Other race, γ_{02}			-1.183*** (*.10*)			-0.905 (*.51*)
Prior Score, γ_{03}			0.686*** (*.00*)			0.694*** (*.01*)
NCLB, γ_{04}			-0.830*** (*.20*)			-0.480 (*.35*)
School choice, β_{01}			-6.242*** (*.45*)			-5.231***(*1.03*)
Rural, β_{02}			-0.108 (*.14*)			-0.509 (*.48*)
Suburb, β_{03}			0.661*** (*.13*)			-0.439 (*.42*)
Charter, β_{04}			-2.445*** (*.57*)			2.149 (*1.68*)
Pupil/teacher ratio, β_{05}			0.044* (*.02*)			-0.187** (*.06*)
Enrollment, β_{06}			-0.002*** (*.00*)			0.000 (*.00*)
% FRL, β_{07}			2.354*** (*.35*)			-0.668 (*1.17*)
Mean growth rate, π_{1jk}	0.494*** (*.01*)	0.498*** (*.01*)	0.659*** (*.02*)	0.658*** (*.02*)	0.578*** (*.03*)	0.652*** (*.06*)
Male, γ_{11}			0.010*** (*.00*)			0.010 (*.01*)
Other race, γ_{12}			0.002 (*.00*)			0.017 (*.01*)
Prior Score, γ_{13}			-0.001*** (*.01*)			0.000 (*.00*)
School choice, β_{11}			0.183*** (*.01*)			0.130*** (*.03*)
Rural, β_{12}			-0.011 (*.01*)			-0.011 (*.02*)
Suburb, β_{13}			-0.039*** (*.01*)			-0.004 (*.02*)
Charter, β_{14}			0.086*** (*.02*)			-0.046 (*.05*)
Pupil/teacher ratio, β_{15}			-0.003*** (*.00*)			0.005* (*.00*)
Enrollment, β_{16}			-0.000*** (*.00*)			-0.000 (*.00*)
% FRL, β_{17}			-0.065*** (*.02*)			-0.039 (*.05*)
NCLB move, π_{2jk}		-0.431* (*.19*)	-0.660*** (*.19*)		-0.831** (*.30*)	-1.826*** (*.35*)
NCLB duration, π_{3jk}		0.020 (*.02*)	0.038* (*.02*)		0.111*** (*.03*)	0.166*** (*.03*)
Move count, π_{4jk}		-0.688*** (*.04*)	-0.413*** (*.04*)		-0.784*** (*.16*)	-0.319* (*.16*)
Mid-year move, π_{5jk}		0.460*** (*.08*)	0.396*** (*.08*)		1.620*** (*.25*)	1.314*** (*.25*)
Grade 2 * growth, π_{7jk}		-0.005 (*.01*)	-0.054*** (*.01*)		0.142*** (.04)	0.045 (*.04*)
Grade 4 * growth, π_{7jk}		-0.058*** (*.01*)	-0.059*** (*.01*)		-0.051 (*.03*)	-0.014 (*.03*)
Grade 5 * growth, π_{7jk}		-0.127*** (*.01*)	-0.152*** (*.01*)		-0.022 (*.03*)	-0.031 (*.03*)
Grade 6 * growth, π_{7jk}		-0.209*** (*.01*)	-0.255*** (*.01*)		-0.066 (*.04*)	-0.101** (*.03*)
Grade 7 * growth, π_{7jk}		-0.234*** (*.01*)	-0.312*** (*.01*)		-0.084* (*.04*)	-0.147*** (*.03*)
Grade 8 * growth, π_{7jk}		-0.287*** (*.01*)	-0.383*** (*.01*)		-0.101* (*.04*)	-0.190*** (*.04*)
Grade 9 * growth, π_{7jk}		-0.317*** (*.01*)	-0.456*** (*.01*)		-0.198*** (*.05*)	-0.326*** (*.05*)
Grade 10 * growth, π_{7jk}		-0.126*** (*.02*)	-0.297*** (*.02*)		-0.005 (*.07*)	-0.162* (*.07*)
Random Effects						
Row Level Variance Components						
Intercept, b_{00j}	228.830*** (*15.13*)	159.812*** (*12.64*)	68.743*** (*8.29*)	271.511*** (*16.48*)	161.624*** (*12.71*)	71.940*** (*8.48*)
Level-1, e_{ijk}	29.49 (*5.43*)	29.166 (*5.40*)	28.890 (*5.37*)	29.806 (*5.46*)	29.826 (*5.46*)	29.563 (*5.44*)
Chi-square	2442567.17	2258263.78	1033710.27	105470.49	95258.82	46588.51
df	64555	64555	64544	3008	3008	2997
Column Level Variance Components						
Intercept, c_{00k}	28.633*** (*5.35*)	35.642*** (*5.89*)	21.617*** (*4.65*)	12.524*** (*3.54*)	15.250*** (*3.91*)	7.631*** (*2.76*)
Chi-square	456712.84	97637.87	524652.37	8140.18	5655.91	9281.67
df	3342	3342	3331	1553	1553	1542
N (Student Observations)		437,769			20,884	
N (Students)		64,556			3,009	
N (School Observations)		3,343			1,554	
N (Schools)		592			367	

*** p<.001; ** p<.01; * p<.05

For the fixed effects, standard errors are in parentheses. For the random effects, standard deviations are in parentheses.
Grade level dummies are controlled for and statistically significant in models 2 and 3.

Table 7. School-Level Logit Models

	Math	Reading
Does School Make AYP?		
Intercept	1.918*	2.087*
	(0.817)	(0.835)
Standardized Average Score	1.172***	1.225***
	(0.278)	(0.288)
School Enrollment	-0.003***	-0.003***
	(0.000)	(0.000)
% Eligible for Free/Reduced Price Lunch	-1.941***	-1.945***
	(0.532)	(0.540)
Pupil/Teacher Ratio	-0.053*	-0.053*
	(0.024)	(0.024)
% White Students	3.815***	3.591***
	(0.565)	(0.587)
Rural	-0.123	-0.090
	(0.160)	(0.161)
Middle School	-3.217***	-3.203***
	(0.340)	(0.336)
High School	-3.219***	-3.070***
	(0.477)	(0.445)
Other Grade Configuration	-2.359***	-2.292***
	(0.409)	(0.399)
N	1715	1715
Pseudo R^2	0.302	0.302
Does School Have to Offer Choice?		
Intercept	-2.405	-2.176
	(1.331)	(1.368)
Standardized Average Score	0.422	0.590
	(0.445)	(0.476)
School Enrollment	0.002***	0.002***
	(0.000)	(0.000)
% Eligible for Free/Reduced Price Lunch	0.946	0.962
	(1.031)	(1.035)
Pupil/Teacher Ratio	0.025	0.028
	(0.046)	(0.045)
% White Students	-4.868***	-5.083***
	(0.914)	(0.970)
Rural	0.250	0.265
	(0.271)	(0.272)
Middle School	3.490***	3.340***
	(0.582)	(0.593)
High School	2.195***	2.023***
	(0.771)	(0.756)
Other Grade Configuration	2.852***	2.752***
	(0.633)	(0.630)
N	1145	1145
Pseudo R^2	0.392	0.393

*** p<.001; ** p<.01; * p<.05
Standard errors are in parentheses.
Year dummy variables are controlled for in the models.

Appendix A. Student Descriptive Statistics, Reading

	NCLB School Choice Policy Movers					Students Who Attend Schools That Offer Choice					
	N	Mean	Std Dev	Min	Max	N	Mean	Std Dev	Min	Max	Mean Diff.
Read RIT Score	15,504	215.47	16.59	140.37	260.56	420,656	216.36	16.01	129.57	287.51	- 0.89***
Grade 2	333	176.75	16.61	140.37	217.38	5,533	180.90	16.41	130.55	223.67	- 4.15***
Grade 3	461	190.01	14.51	143.09	221.77	14,156	193.66	14.56	138.64	236.10	- 3.65***
Grade 4	864	200.33	13.33	150.11	229.52	31,471	202.78	13.15	140.04	252.76	- 2.45***
Grade 5	2,035	208.52	13.15	147.60	240.88	52,556	208.81	13.13	141.27	257.54	- 0.29***
Grade 6	2,933	213.80	13.12	144.15	249.52	74,509	214.08	13.13	129.57	265.15	- 0.28***
Grade 7	3,494	218.21	12.68	151.88	252.52	83,648	218.74	12.68	137.40	275.37	- 0.53***
Grade 8	3,054	222.84	12.68	148.99	256.34	75,288	222.54	12.65	142.08	276.17	0.30***
Grade 9	1,641	224.41	14.34	152.03	258.53	54,445	225.06	13.76	139.77	287.51	- 0.65***
Grade 10	689	230.02	12.61	173.32	260.56	29,050	229.22	12.35	144.52	277.29	0.80***
Grade 2 * Month	15,504	0.40	3.12	0	44	420,656	0.27	2.87	0	44	0.13***
Grade 3 * Month	15,504	0.70	4.60	0	44	420,656	0.41	3.11	0	44	0.29***
Grade 4 * Month	15,504	0.89	4.95	0	44	420,656	0.91	4.21	0	44	- 0.02
Grade 5 * Month	15,504	1.57	5.68	0	44	420,656	2.06	6.67	0	44	- 0.49***
Grade 6 * Month	15,504	3.21	8.02	0	44	420,656	3.71	9.59	0	44	- 0.50***
Grade 7 * Month	15,504	5.32	11.30	0	44	420,656	4.80	11.20	0	44	0.52***
Grade 8 * Month	15,504	6.08	13.12	0	44	420,656	4.70	11.33	0	44	1.38***
Grade 9 * Month	15,504	3.61	10.78	0	44	420,656	4.04	11.02	0	44	- 0.43***
Grade 10 * Month	15,504	1.69	7.94	0	44	420,656	2.44	9.13	0	44	- 0.75***
NCLB duration	15,504	3.80	6.35	0	23	420,656	0	0	0	0	--
Move count	15,504	0.63	0.79	0	6	420,656	0.19	0.48	0	5	0.44***
Mid-year move	15,504	0.06	0.24	0	1	420,656	0.01	0.11	0	1	0.05***
Number of Tests	15,504	4.64	2.23	1	8	420,656	4.63	2.22	1	8	0.01
Prior Score, Math	2,246	209.28	17.80	154.38	270.76	62,311	212.03	19.14	142.09	283.99	- 2.75***
Gender (1 = male)	2,246	0.52	0.50	0	1	62,311	0.52	0.50	0	1	0.00
Other race	2,246	0.19	0.39	0	1	62,311	0.21	0.40	0	1	- 0.02

*** p<.001; ** p<.01; * p<.05

Appendix B. Student Descriptive Statistics, Reading Propensity Score Sample

	NCLB School Choice Policy Movers					Students Who Attend Schools That Offer Choice					
	N	Mean	Std Dev	Min	Max	N	Mean	Std Dev	Min	Max	Mean Diff.
Read RIT Score	11,498	215.80	16.86	140.37	260.56	9,492	215.43	16.38	139.30	264.77	0.37***
Grade 2	263	177.29	16.54	140.37	217.38	237	178.24	16.66	139.30	221.15	- 0.95**
Grade 3	351	190.24	14.19	143.09	221.77	342	191.68	13.62	149.43	224.32	- 1.44***
Grade 4	722	200.86	12.93	150.11	229.35	644	201.87	12.84	152.03	236.95	- 1.01***
Grade 5	1,471	208.31	13.24	147.60	238.01	1,284	209.23	12.89	152.46	239.55	- 0.92***
Grade 6	2,073	214.17	13.32	144.15	249.52	1,877	214.50	12.93	147.27	249.32	- 0.33**
Grade 7	2,611	218.63	12.85	151.88	252.52	2,073	219.01	12.15	156.23	251.81	- 0.38***
Grade 8	2,186	223.12	12.85	159.70	256.34	1,703	223.41	12.17	163.32	258.85	- 0.29**
Grade 9	1,240	225.55	13.93	154.01	258.53	994	225.24	13.62	161.86	253.96	0.31*
Grade 10	581	231.00	12.41	173.32	260.56	338	229.10	13.17	166.91	264.77	1.90***
Grade 2 * Month	11,498	0.44	3.29	0	44	9,492	0.45	3.33	0	44	- 0.01
Grade 3 * Month	11,498	0.72	4.67	0	44	9,492	0.75	4.68	0	44	- 0.03
Grade 4 * Month	11,498	0.91	4.92	0	44	9,492	1.00	5.10	0	44	- 0.09**
Grade 5 * Month	11,498	1.62	5.71	0	44	9,492	1.75	5.94	0	44	- 0.13***
Grade 6 * Month	11,498	3.24	8.27	0	44	9,492	3.52	8.60	0	44	- 0.28***
Grade 7 * Month	11,498	5.26	11.39	0	44	9,492	5.47	11.58	0	44	- 0.21***
Grade 8 * Month	11,498	5.69	12.61	0	44	9,492	5.65	12.78	0	44	0.04
Grade 9 * Month	11,498	3.62	10.70	0	44	9,492	3.63	10.91	0	44	- 0.01
Grade 10 * Month	11,498	1.97	8.59	0	44	9,492	1.35	7.11	0	44	0.62***
NCLB duration	11,498	3.46	6.04	0	23	9,492	0	0	0	0	--
Move count	11,498	0.61	0.78	0	6	9,492	0.23	0.52	0	5	0.38***
Mid-year move	11,498	0.06	0.23	0	1	9,492	0.02	0.13	0	1	0.04***
Number of Tests	11,498	4.64	2.23	1	8	9,492	4.67	2.23	1	8	- 0.03
Prior Score, Math	1,640	209.62	18.15	154.38	270.76	1,366	209.04	18.92	153.90	267.54	0.58***
Gender (1 = male)	1,640	0.51	0.50	0	1	1,366	0.53	0.50	0	1	- 0.02
Other race	1,640	0.18	0.39	0	1	1,366	0.18	0.38	0	1	0.00

*** p<.001; ** p<.01; * p<.05

Appendix C. Cross-Classified Random Effects Model of Reading Achievement Growth for Students

	Reading			Reading, Propensity Score Sample		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Fixed Effects						
Mean initial status, π_{0jk}	200.610*** (*.13*)	189.389*** (*.18*)	202.460*** (*.42*)	200.195*** (*.37*)	189.086*** (*.72*)	202.079*** (*1.40*)
Male, γ_{01}			-2.561*** (*.07*)			-2.607*** (*.32*)
Other race, γ_{02}			-3.926*** (*.09*)			-3.453*** (*.45*)
Prior Score, γ_{03}			0.755*** (*.00*)			0.735*** (*.01*)
NCLB, γ_{04}			-0.244 (*.17*)			-0.247 (*.30*)
School choice, β_{01}			-4.569*** (*.43*)			-4.980*** (.94)
Rural, β_{02}			-0.225 (*.13*)			-0.182 (*.43*)
Suburb, β_{03}			0.151 (*.13*)			-0.092 (*.39*)
Charter, β_{04}			-2.142*** (*.55*)			-2.486 (*1.50*)
Pupil/teacher ratio, β_{05}			0.015 (*.02*)			0.024 (*.05*)
Enrollment, β_{06}			-0.001*** (*.00*)			-0.001 (*.00*)
% FRL, β_{07}			-0.896** (.33)			-3.870*** (*1.11*)
Mean growth rate, π_{1jk}	0.379*** (*.01*)	0.366*** (*.01*)	0.337*** (*.02*)	0.497*** (*.01*)	0.476*** (*.03*)	0.490*** (*.05*)
Male, γ_{11}			0.012*** (*.00*)			0.008 (*.01*)
Other race, γ_{12}			0.017*** (*.00*)			0.016 (*.01*)
Prior Score, γ_{13}			-0.004*** (*.00*)			-0.003*** (*.00*)
School choice, β_{11}			0.137*** (*.01*)			0.126*** (*.03*)
Rural, β_{12}			0.002 (*.01*)			-0.001 (*.02*)
Suburb, β_{13}			-0.005 (*.01*)			-0.009 (*.02*)
Charter, β_{14}			0.057** (*.02*)			0.065 (*.05*)
Pupil/teacher ratio, β_{15}			-0.002* (*.00*)			-0.002 (*.00*)
Enrollment, β_{16}			-0.000** (*.00*)			-0.000 (*.00*)
% FRL, β_{17}			0.052** (*.02*)			0.104* (*.05*)
NCLB move, π_{2jk}		-0.594** (*.19*)	-0.554** (*.20*)		-1.176*** (*.31*)	-1.604*** (*.35*)
NCLB duration, π_{3jk}		0.009 (*.02*)	-0.005 (*.02*)		0.077** (*.03*)	0.102*** (*.03*)
Move count, π_{4jk}		-0.115** (*.04*)	0.109** (*.04*)		-0.267 (*.17*)	0.016 (*.16*)
Mid-year move, π_{5jk}		0.405*** (*.08*)	0.277*** (*.08*)		1.666*** (*.26*)	1.094*** (*.26*)
Grade 2 * growth, π_{7jk}		0.093*** (*.01*)	-0.019* (*.01*)		0.223*** (.04)	0.083* (*.03*)
Grade 4 * growth, π_{7jk}		-0.075*** (*.01*)	-0.024*** (*.01*)		-0.097*** (.03)	-0.014 (*.03*)
Grade 5 * growth, π_{7jk}		-0.161*** (*.01*)	-0.103*** (*.01*)		-0.144*** (.03)	-0.053 (*.03*)
Grade 6 * growth, π_{7jk}		-0.181*** (*.01*)	-0.120*** (*.01*)		-0.169*** (.03)	-0.076* (*.03*)
Grade 7 * growth, π_{7jk}		-0.157*** (*.01*)	-0.096*** (*.01*)		-0.130*** (.04)	-0.048 (*.03*)
Grade 8 * growth, π_{7jk}		-0.174*** (*.01*)	-0.105*** (*.01*)		-0.138*** (.04)	-0.060 (*.04*)
Grade 9 * growth, π_{7jk}		-0.110*** (*.01*)	-0.065*** (*.01*)		-0.097* (.05)	-0.073 (*.05*)
Grade 10 * growth, π_{7jk}		-0.012 (*.02*)	0.004 (*.02*)		-0.011 (.08)	-0.044 (*.07*)
Random Effects						
Row Level Variance Components						
Intercept, b_{00j}	181.188*** (*13.46*)	133.345*** (*11.55*)	47.615*** (*6.90*)	223.045*** (*14.93*)	132.743*** *(11.52)*	53.120*** (*7.29*)
Level-1, e_{ijk}	31.677 (*5.63*)	31.362 (*5.60*)	30.775 (*5.55*)	31.820 (*5.64*)	31.580 (*5.62*)	31.091 (*5.58*)
Chi-square	1837144.65	1727668.13	689505.09	78258.58	71357.39	32487.81
df	64554	64554	64543	3005	3005	2994
Column Level Variance Components						
Intercept, c_{00k}	17.440 (*4.18*)	18.50*** (*4.30*)	11.650*** (*3.41*)	8.997*** (*3.00*)	9.173*** (*3.03*)	4.794*** (*2.19*)
Chi-square	210945.08	46481.14	730912.67	7556.44	4320.48	8693.84
df	3340	3340	3329	1596	1596	1585
N (Student Observations)		436,160			20,990	
N (Students)		64,555			3,006	
N (School Observations)		3,341			1,597	
N (Schools)		592			373	

*** p<.001; ** p<.01; * p<.05

For the fixed effects, standard errors are in parentheses. For the random effects, standard deviations are in parentheses.
Grade level dummies are controlled for and statistically significant in models 2 and 3.