

A NATIONAL STUDY COMPARING CHARTER AND TRADITIONAL
PUBLIC SCHOOLS USING PROPENSITY SCORE ANALYSIS

by

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ABSTRACT

The concept of school choice within the United States is not new. Private schools have been educating students since the founding of the United States. However, in 1988, Ray Budde proposed an alternative approach to school choice that has come to be known as charter schools (Kolderie, 2005). Unlike their private school counterparts, charter schools receive public funding, but they are relieved of many of the bureaucratic and regulatory constraints public schools adhere to, but are still held accountable for student performance. Despite claims by charter school advocates that charter schools are performing as well if not better than the public school counterparts (see e.g. Allen, Consoletti, & Kerwin, 2009), studies provide mixed results with regard to charter school performance (see e.g. Braun, Jenkins, & Grigg, 2006; Center for Research on Education Outcomes, 2009; Hubbard & Kulkarni, 2009). Ultimately, there is agreement that more research is necessary to address the question of whether charter schools provide substantially better academic experiences for students.

This study includes development of new methods designed for observational data analysis to investigate the question of whether students who attend charter schools outperform their public school counterparts on two key academic domains: reading and mathematics. The new methods represent extensions of modern methods for propensity score analysis (see below) and aim to reduce if not eliminate selection bias in the context of clustered data. Charter schools are, by definition, schools of choice, and this means that observational data methods are preferred for comparing such schools with others. In observational data contexts, simple comparisons of two groups such as traditional public and charter schools cannot help but ignore the inherent and systematic differences between the two groups. However, given well designed observational studies, and appropriate analysis methods, the effects of the selection bias can be reduced, if not eliminated. The end result is that the usual simple comparisons of two independent groups are replaced by comparisons that make adjustments for covariate differences.

This is done utilizing a class of statistical procedures introduced by Rosenbaum and Rubin (1983) called propensity score analysis. Propensity score analysis has seen considerable increased use in the social sciences within the last few years (Arpino & Mealli, 2008). However, its use in situations where multilevel, or clustered data are of interest, have been limited (Thoemmes & Kim, 2011). Using data from the 2007 National Assessment of Educational Progress (NAEP) for

mathematics and reading at grades four and eight, estimates of the differences between charter and public schools will be calculated at two levels, namely state and national. Given the variability of charter schools laws across states, it is important to consider the impact of clustering. Analyses will be conducted using the newly developed `multilevelPSA` package (Bryer, 2011) in R (R Development Core Team, 2008). Specifically, propensity scores will be estimated within each state and these will be used for matching or stratification of students within each state. Comparisons of specific students, or groups of students, will in all cases be done within states. Effects will then aggregated to provide state and national effect estimates.

As with all propensity score analyses, it is preferable to utilize multiple methods for estimating propensity scores (see e.g. Stuart, 2010). Doing so can help to provide confidence that results reflect what the data have to say, and is not merely an artifact of model specification or method choice. This study will utilize three overall approaches to propensity score analysis, namely stratification, matching, and multilevel stratification. Lastly, the use of graphics will be employed to evaluate balance and outcome differences using methods (functions) found in Helmreich and Pruzek (2009).

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CHAPTER 1: INTRODUCTION

Since the opening of the first charter school in Minnesota in 1991, the United States¹ has increasingly embraced charter schools as an important option for educational reform. In the last 10 years alone, the number of charter schools has grown from 507 in the 1998-1999 school year to 4,561 in the 2007-2008 school year (see figure 1; Center for Education Reform, 2010). Currently, 40 states and the District of Columbia have charter school laws (see appendix A for enrollment by state & appendix B for a thematic map of the U.S. depicting the number of operating charter schools as of 2008). And, given Arne Duncan's appointment as Secretary of Education by President Barack Obama, who has been a charter school supporter, charter school growth and support is unlikely to slow in the near future.

In principal, charter schools have opted out of bureaucratic rules and union contracts in order to gain academic autonomy in exchange for accountability and better academic environments for students (Wells, 2002). The idea is that, under this framework, teachers, administrators, students, and the community that comprise the charter school would be free to innovate. It is also the assumption that charter schools would serve as experimental schools where the innovations would inform reform of public education at large. However, some supporters argue for the eventual replacement of traditional public schools with charter schools, as further exemplified by the attempted school voucher legislation during the second Bush Administration.

Clearly charter schools have become a popular vehicle for educational reform among parents as well. The Center for Education Reform (2008) reports that 59% of charter schools have waiting lists averaging 198 students. Charter schools provide an apparent choice to parents and are copacetic to the United State's individualistic (see e.g., Hofstede & Hofstede, 2004; MacCall, 1847; Swart, 1962) culture. Moreover, like so many other fields, school reform has further emphasized marketization and privatization (Wells, 2002). The influence of capitalism on education is not new. A major contributor to the expanded role of education during the industrial revolution is capitalism itself. That is, education expanded its initial purpose of providing a minimally informed electorate to providing an educated work force, not to mention keeping children off the streets as child labor laws came into existence. However, the shift of capitalistic principles from being the inspiration of educational reform to being the educational reform has profound implications.

¹Though this study focuses on charter schools in the U.S., Canada (Foundations for the Future Charter Academy, 2007), Chile (Larrañaga, 2004), England (? , ?), Germany (Herbst, 2006), and New Zealand (Lander, 2001) also have charter schools.

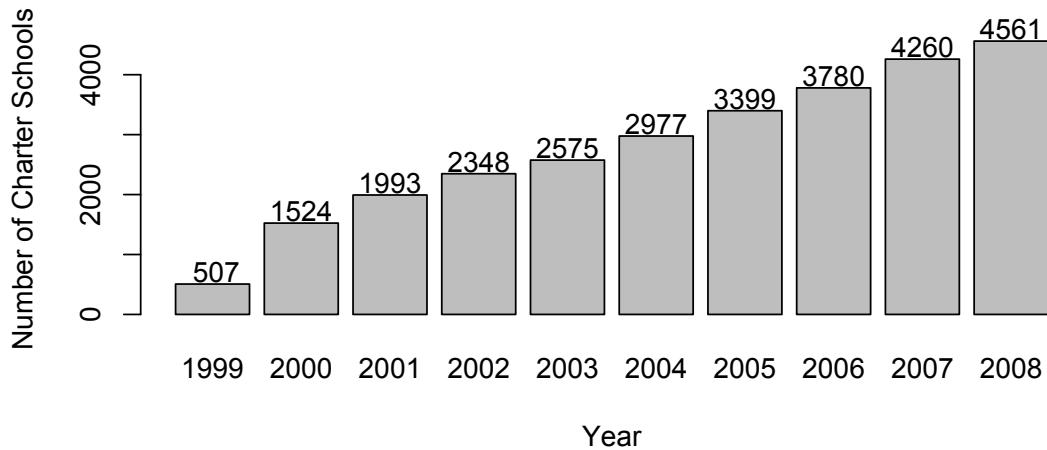


Figure 1: Charter School Growth 1999-2008

Proponents of charter schools argue that public schools have been bogged down by bureaucracy and union contracts. Freeing schools of these requirements then allows teachers and schools to innovate, which in theory leads to increased student performance. The principled argument is the “market metaphor” (Wells, 2002). That is, if schools were forced to compete for “customers” (i.e. students), then the differentiating factor between schools would be the quality of education.

Opponents on the other hand have questioned the accountability, equity, effectiveness, and sustainability of charter schools. Several studies have shown that charter schools are not only failing to increase student performance, in many instances they are performing well under their traditional public school counterparts (see e.g., Center for Research on Education Outcomes, 2009; ?, ?; Nelson, Rosenberg, & Meter, 2004). Others still argue whether charter schools may be a solution in search of a problem. Carnoy, Jacobsen, Mishel, and Rothstein (2005) in summarizing the controversy that ensued after the Nelson et al. (2004) study argue that:

If, however, charter schools are not improving the achievement of disadvantaged children, it may be that the cause of low student performance is not bureaucratic rules but something else. When a treatment is based on a diagnosis, and the treatment doesn’t work, it is prudent to examine not only whether the treatment should be improved, but also whether the diagnosis might be flawed. (Carnoy et al., 2005)

Issues with Charter School Research

The issues surrounding charter schools are immense. However, given the implications for the current and future generations of students, the issue must be explored using the best data and methods available. As [] point out, there are three major obstacles to addressing the question of “whether students in charter schools are learning more or less than they would have learned in conventional schools” (p. 1), namely:

1. The issues of counterfactuals. That is, there are several barriers to determine the causal relationship between school choice and learning.
2. The variation in types of charter schools.
3. The nature of student achievement. Research has shown there are many other factors that contribute to student success including, but not limited to, social economic status, parents education, motivation, etc. The ability to decipher how school choice contributes to student learning in the context of all the other factors proves difficult.

Though these issues are significant, they can to a large extent be reasonably addressed. We will not claim to fully account for these issues, however given the need for evidence to inform policy makers regarding charter school effectiveness, we will attempt to address these issues using the best data and methods available while clearly stating the limitations.

Issue one will be dealt with in more detail in chapter three. However, in short, the propensity score analysis (PSA) proposed for this study is arguably, assuming proper implementation, one of the best approaches to estimating causal inferences short of well designed randomized experiments. Of course in the context of an observational study the fundamental problem of causal inference Holland (1986) remains, but limitations of this will be addressed.

The issue of charter school variation is often cited in critiques of national or large scale charter school studies. Given that the charter school debate is a national debate that has implications at the Federal level, large scales studies are not only necessary, they are critical. If charter schools are to be offered wholly as an alternative to traditional public schools, then charter schools as a whole must be evaluated against public schools as a whole. More specifically, we wish not to evaluate whether a particular charter school, or type of charter school, is better, but whether the entire charter school concept is a better approach for educational reform.

Lastly, the environmental, social, community, and cultural factors that contribute to a student's academic achievement are often significantly underestimated. Often educational reform, as exemplified most recently by the No Child Left Behind Act, places the responsibility solely on the school without consideration of the context in which the school operates. We are encouraged by President Obama's remarks to his first Joint Session of Congress (? , ?):

These education policies will open the doors of opportunity for our children. But it is up to us to ensure they walk through them. In the end, there is no program or policy that can substitute for a mother or father who will attend those parent/teacher conferences, or help with homework after dinner, or turn off the TV, put away the video games, and read to their child. I speak to you not just as a President, but as a father when I say that *responsibility for our children's education must begin at home* [emphasis added].

Though we must be acutely aware and acknowledge the fact that schools are merely one factor of many that contribute to a students academic achievement, it does not preclude us from evaluating schools for their part. Similar to issue one, we argue that PSA provides an approach to best approximate the effects of school choice.

Guiding Research Question

Given that charter schools are being offered as a solution for the needed educational reform nationally, it is imperative that they be evaluated from a national perspective. This study proposes to compare the academic performance in two domains of charter schools and public schools using the National Assessment of Educational Progress and propensity score analysis. More specifically, this study proposes to address the question: Are there differences between charter and public schools? And if so, what is the nature and extent of those differences?

CHAPTER 2: REVIEW OF THE LITERATURE

History of Charter Schools

Though Ray Budde is often credited with the current charter school movement (?), the term *school choice* can be traced back to Adam Smith's *Wealth of Nations*, Thomas Paine's *Rights of Man*, and John Stuart Mill's *On Liberty* (Herbst, 2006). Prior to the Revolutionary War, given the religious diversity of colonial America, issues of education were left to local communities. However, after the war Revolutionary leaders argued that local schools were no longer sufficient for educating students for the emerging state and federal governments. It was Thomas Jefferson who, in 1779, introduced the first bill in Virginia that would establish a public school system. It was this, along with numerous other American intellects during the 1780s and 1790s, that established public schools throughout the young nation thereby relegating school choice to a choice between the public school and, predominately religious, private schools.

In the wake of the landmark report *A Nation at Risk* (The National Commission on Excellence in Education, 1983), Budde (1988) authored a pivotal document that started the charter school movement in the United States. In this document, Budde argues that system-wide changes to the way schools are structured are required including: more rigorous curriculum and graduation standards; extended school days and year; more homework; teacher accountability for student results; termination of “incompetent” teachers; and higher pay for teachers. To achieve these goals, he proposed a fundamental change to the “internal organization of the school district... making substantial changes in the roles of teachers, principals, the superintendent, the school board, parents, and others in the community” (p. 16). More specifically, a framework for charter schools was proposed that includes five stages over a three year period (see figure 2). The five stages include: (1) generating ideas; (2) planning the charter; (3) preparing for teaching; (4) teaching under the educational charter; and (5) program monitoring and evaluation. For the first iteration of the cycle, stages one, two, and three occur prior to the opening of the school with stage one ideally beginning a full school year before. There are several features of this framework that deviate from traditional public school models, but most notably is the repetition of what may appear to be preparational stages. That is, the charter school must re-plan their school structure periodically (every three to five years according to Budde’s framework) in a manner consistent to the initial charter school creation, thereby forcing a re-evaluation of the school bureaucracy.

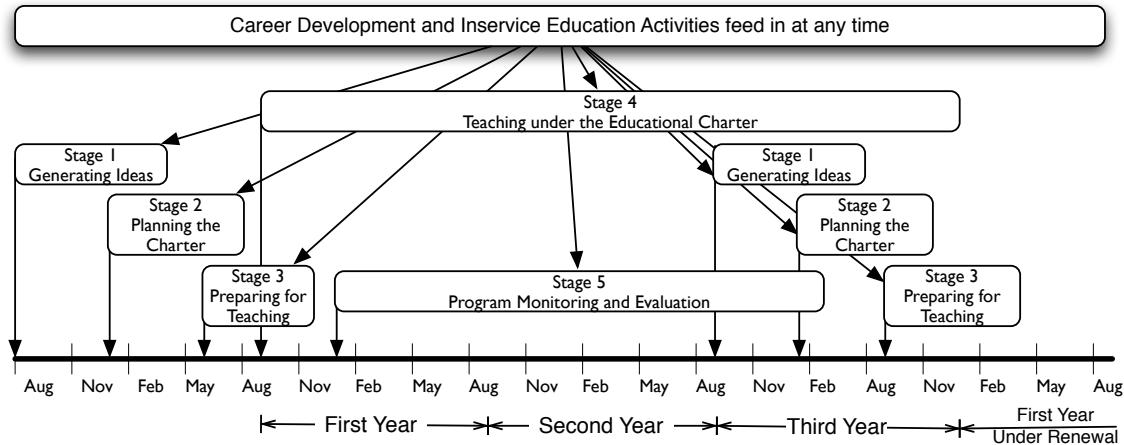


Figure 2: Stages of a Charter School Life Cycle (adapted from Budde, 1988)

Following the suggestions of Budde, Minnesota passed the first charter school law in 1991 with California being the second following in 1992. As of spring 2009, 40 states and the District of Columbia have charter school laws which comprise 1,407,421 students in 4,578 schools (Center for Education Reform, 2010). According to National Alliance of Public Charter Schools (2009), there are currently over 200 studies that examine charter school achievement.

Empirical Evidence for Charter School Effectiveness

Given that program evaluation and accountability are fundamental components of the philosophical foundations of charter schools, there are remarkably few *high quality* empirical studies that address, at a national level, the academic effectiveness of charter schools (c.f. National Alliance of Public Charter Schools, 2009; ?, ?). That is not to say that there are not any studies that examine charter school achievement. The National Alliance of Public Charter Schools (2009) provide a review of 140 studies selected on several criteria. Their review reveals significant gaps in the research with regard to states evaluated, research quality that addresses achievement, as well as timeliness of results. This is further exemplified by a meta-analysis conducted by ? (?) that includes just 13 studies that represent nine states. In this section we will provide an overview of the current literature available vis-à-vis the published meta-analysis and literature reviews. We then focus on two recent studies that together provide the context for the study proposed here. More specifically, a hierarchical linear modeling analysis of the 2005 NAEP study (?, ?) and a matching study comparing charter and public schools in 16 states (Center for Research on

Education Outcomes, 2009).

Overview of Current Studies

Research has shown that parents of students in charter schools are generally more satisfied with the charter school than the public school and will also tend to be more involved in their child's education (?, ?, ?). However, their satisfaction may simply be a rationalization (?, ?). Moreover, Fuller et al. (1996, as cited in ?, ?) suggest that parents that choose charter schools "believe that the charter must therefore be superior to a conventional public school" (p. 177). This is collaborated by a study conducted by ? (?) that examines school choice in Chicago Public Schools whereby more than half of students elect to attend another Chicago Public School (e.g. career academy, high-achieving school) rather than their locally assigned school. Though students who opt out of their local school are more likely to graduate, ? (?) argue that "those who opt out are superiour along unobservable dimensions such as their motivation level and parental involvement" (p. 755).

The National Alliance of Public Charter Schools (2009) provides perhaps the most comprehensive review of available research on charter school performance. The current report, *Charter School Achievement: What We Know* is now in its fifth edition having been updated periodically to account for recent studies. In addition to covering published research reports, the review includes unpublished reports including conference presentations, dissertations, policy group and think tank reports, and state evaluations. Of the 210 studies identified, 140 are included in their review given that the study compares charter schools with traditional public schools, the study uses "serious research methods" (p. 2), and "examines a significant segment of the charter sector." The studies are then further categorized into one of three categories: (1) panel studies that are longitudinal and examine student growth over time; (2) cohort change studies that are longitudinal but use some other method than tracking individual students; and (3) snapshot studies that examine school performance at a single point in time (also known as observational studies).

Table 1 summarizes the findings of the 140 studies included first, by breaking out the year(s) the study's data is based upon, and second by the results reported. It should be noted that many of the pre-2001 studies were concentrated in a few states (Arizona, California, Florida, North Carolina, and Texas). This is expected given that these states are among the earliest to adopt charter school laws (see appendix A) as well as the substantial increase in the number of charter

Table 1: Summary of Studies on Charter School Achievement

	Pre 2001				Post 2001			
	Larger Gains	Similar Gains	Mixed Gains	Smaller Gains	Larger Gains	Similar Gains	Mixed Gains	Smaller Gains
Math	4 (13%)	4 (13%)	4 (13%)	20 (63%)	17 (35%)	17 (35%)	1 (2%)	14 (29%)
	7 (21%)	10 (29%)	3 (9%)	14 (41%)	18 (40%)	12 (27%)	1 (2%)	14 (31%)
Source: National Alliance of Public Charter Schools, 2009								

schools since 2000 (see figure 1). The National Alliance of Public Charter Schools conclude that:

[I]t becomes dramatically clear that studies examining public charter schools in more recent academic years show that charter schools produce more instances of larger achievement gains in both math and reading when compared to traditional public schools. (p. 3)

However, this interpretation downplays the fact that approximately 30% of charter schools performed worse than their traditional public school counterpart. These results are consistent with a recent by the Center for Research on Education Outcomes (2009) that reported that 37% of charter schools performed worse than their public school counterpart (this study is discussed in more detail below).

? (?) employ more stringent selection criteria for including studies in their meta-analysis. More specifically, only studies that used experimental student-level growth-based methods were included, resulting in a total of 14 studies published between 2001 and 2007 utilizing data ranging from 1998 through 2005. Similarly to National Alliance of Public Charter Schools (2009), studies included a limited number of locations including Arizona, California (three of which from San Diego specifically), Chicago, Delaware, Florida, Idaho, North Carolina, and Texas with one additional anonymous location. Overall, their analysis of the available studies provide very mixed results. However, some patterns to charter and public school differences emerge, specifically that charter schools generally outperform traditional public schools in elementary school reading and middle school math, though effect sizes for the latter are small. However, for high school reading and math charter schools are generally underperforming traditional public schools, but it should be noted that studies examining these grade levels is relatively small (see also, National Alliance of Public Charter Schools, 2009).

Two NAEP Studies Using HLM

An increasingly used statistical method that allows for the analysis of studies where observations are not independent is hierarchical linear modeling (HLM), or multi-level analysis. In the context of the charter school question, comparing students in charter schools to public school counterparts with, say ordinary least squares or ANOVA, is inappropriate since these statistical models do not account for the school effects. HLM provides a model for which school effects can be partitioned from student effects thereby providing adjustments for the lack of independence of observations (see e.g., ?, ?, ?).

Braun, Jenkins, and Grigg have published two research reports utilizing NAEP and HLM that look at how public school students compare to private school students (?) and charter schools students (?). Note that the former study used the 2005 administering of NAEP whereas the latter used the 2003 administering of NAEP. A key advantage of using NAEP is that many student (see appendix C) and school level variables are available. Moreover, as of 2003 charter schools have been oversampled to ensure sufficient sample sizes for appropriate comparisons to be made.

Comparing Private and Public Schools.

For the private school study (?, ?), results found that students in private schools scored significantly higher than public school students in both mathematics and reading at grades 4 and 8. Differences ranged from 8 points for grade 4 mathematics to 18 points for grade 8 reading. Adjusting for student characteristics with HLM resulted in reductions in all four comparisons of approximately 11 to 14 points. After adjustment, private school students still scored significantly higher than public school students in grade 8 reading, but public schools scored significantly better in grade 4 mathematics. There was no significant difference for grade 4 reading and grade 8 mathematics.

Comparing Charter and Private Schools.

For the charter school study (?, ?) analysis was conducted in three phases for both reading and mathematics. In phase one, all charter schools were compared to all public schools. Results found that, when student characteristics were adjusted for, charter schools performed on average 4.2 points lower than public schools in reading (corresponding effect size is 0.11 standard deviations) and 4.7 points lower in mathematics (corresponding effect size is 0.17 standard

deviations).

Phase two separated charter schools into two groups: charter schools that are associated with a public school district (PSD) and those that are not. Separate analysis were performed for each charter school type with public schools. For reading, there was no significant difference between charter schools affiliated with a PSD and public schools. However, for schools not affiliated with a PSD, charter school students scored significantly lower than public school students with an adjusted difference of 0.17 standard deviations. Similarly for mathematics, there was no difference between charter schools affiliated with a PSD and public schools but charter schools not affiliated with PSD scored significantly lower with an adjusted difference of 0.23 standard deviations.

Lastly, phase three compared only charter and public schools located in a central city and serving a high-minority population. For reading, there was no significant difference between charter and public schools for any model. For mathematics however, charter schools not affiliated with a PSD scored significantly lower than public school students with an adjusted difference of 0.17 standard differences. There was no difference for schools affiliated with a PSD.

The CREDO Study

The Center for Research on Education Outcomes (2009) conducted a study of more than 1.7 million records from 2400 charter within 16 states. The methodology involves creating a Virtual Control Record (VCR) for each charter school student (see also, ?, ?; Northwest Evaluation Association, 2009) which is used to find matching student from an eligible traditional public school. Students within a traditional public school become available in a pool of potential matches when at least one student is identified as transferring to a charter school. Once the “feeder schools” are identified, all students from feeder schools are pooled and serve as the source to select matches to the charter school students. Students are then matched on the following factors: grade-level, gender², race/ethnicity, free or reduced price lunch status, English language learner status, special education status, and prior test score on state achievement tests. This procedure, which is similar to propensity matching, resulted in 83.7% and 84.4% of charter school students being matched to a public school student for reading and math, respectively.

Once matches were determined, ordinary least squares regression was utilized to analyze both math and reading scores, separately, across the charter school students and matched public school

²Gender was not available in Florida

students. Moreover, controls for student characteristics used above, excluding gender, along with state indicators and scores affected by Hurricane Katrina, were added to the basic model. Overall results show that charter school students performed, on average, 0.01 and 0.03 standard deviations below public school students for reading and math, respectively. Both results are significant at $p \leq 0.01$.

Though the magnitude of the overall effects may not necessarily suggest charter schools are performing substantially lower than their public school counterparts, further analysis by Center for Research on Education Outcomes (2009) reveal more nuanced understanding of the differences. More specifically, the effectiveness of charter schools varied considerably by state. Five states (Arkansas, Colorado, Illinois, Louisiana, & Missouri) were found to have higher learning gains for charter schools. Six states (Arizona, Florida, Minnesota, New Mexico, Ohio, & Texas) were found to have lower learning gains for charter schools. The remaining four states (California, District of Columbia, Georgia, & North Carolina) had either mixed results or no difference in academic gains.

Lastly, the Center for Research on Education Outcomes (2009) found variation of charter school effectiveness across school characteristics. That is, schools that focused on elementary or middle grades separately, tended to perform as well or better than their public school counterparts. However, for charter schools that focused on high grades or multi-level grades performed anywhere from .02 to .08 standard deviations below public schools. Moreover, school level comparisons find that only 17% of charter schools perform better than public schools while 46% perform no differently and 37% perform significantly worse.

CHAPTER 3: METHOD

This chapter will outline the methods that will be utilized to describe and analyze the data in order to address the research questions central to this study. Given the strong political interests in the question of charter school effectiveness and the implications for educational policy both at the state and national level, obtaining good empirical evidence, preferably with strong causal inferences, is most desirable. The *gold standard* of inferential research is the randomized experiment. A research design that addresses the charter school question proposed here would require that students be randomly assigned, possibly with blocking on key covariates, to either a charter or public school. The theoretical justification for such a scheme is that any systematic differences between the two groups would be balanced through the randomization processes. However, in practice, especially in education, such randomization is neither feasible nor ethical. The result of the lack of randomization is a phenomenon called selection bias. That is, any comparisons of the two groups will be biased given the fact that the units of study, students in this study, self-selected to be in their respected group. Propensity score analysis (?, ?) is a statistical approach whereby the differences between the two groups are balanced by the careful analysis of covariate information. This procedure lends itself well to secondary analysis of observational data.

Overview of NAEP

The source of the data that will be utilized in this study is provided by the National Center for Educational Statistics (NCES) which is within the U.S. Department of Education's Institute of Education Sciences (IES). The National Assessment of Educational Progress (NAEP) was started in 1971 and has provided national measures of student achievement in many subjects including mathematics, reading, science, writing, history, civics, and the arts. In 2003 NAEP began assessing charter schools as well as private and public schools. This study will utilize the 2007 administering of the NAEP assessments in mathematics and reading within grades four and eight. The 2007 assessment included over 6,000 public schools and over 200 charter schools comprising of over 145,000 and 3,000 students, respectively. Given this relatively large, nationally representative sample, analysis of NAEP assessments utilizing propensity score analysis may prove to provide valuable insights into the academic differences between charter and public schools.

More than simply providing large samples, another key advantage of NAEP is the fact that it is not designed to assess individual students or schools, but instead is designed to inform

subject-matter achievement, instructional experiences, and school environments (Braun, Jenkins, & Grigg, 2006). To achieve this goal, NAEP utilizes a complex item-sampling design such that individual students are presented a subset of the total items, thereby reducing the burden on participants. Though not appropriate for assessing individual student achievement, in aggregate the NAEP measures provide a robust and accurate estimate of student achievement.

In addition to subject area measures, NAEP includes student, teacher, and school questionnaires that provide contextual information about the students' environment. Given that PSA relies on adjusting for selection bias by adjusting for known covariates, it are the answers to these questionnaires that will serve as the basis for determining a students propensity score, or likelihood of being in the treatment (i.e. charter school in the context of this study). In addition to typical demographic items such as gender and race, students are asked about computers, books, magazines, and encyclopedias in the home; parents education level; and the level of interaction with academics within the home (see appendix C for complete list of items).

The responsibility for developing the assessment objectives and test specifications lies with the National Assessment Governing Board which was created by Congress in 1988. Traditionally they are the states that have provided the legal guidance for school governance including accountability measures. Given the varied standards across states, it is this governing board that is to determine nationally what are appropriate achievement goals for each age and grade. The following two sections will provide the framework for mathematics and reading assessments.

Mathematics

Since 1990, the Council of Chief State School Officers (CCSSO) has been contracted to design a framework for the mathematics assessment (National Assessment Governing Board, 2006a). The framework was most recently updated in 2000 to take into account state standards, the National Council of Teachers of Mathematics (NCTM) standards, the Trends International Mathematics and Science Study (TIMSS), the Achieve Project, and a 2001 report issued by the National Research Council of the National Academy of Sciences. The result of their work was six recommendations for the mathematics assessment regarding content areas, mathematical complexity of items, distribution of items, item formats, manipulatives, and calculators. For the purposes of the study proposed, a composite score will be utilized that is comprised of five content areas, number properties and operations; measurement; geometry; data analysis and probability;

Table 2: Distribution of Math Items by Grade and Content Area

Content Area	Grade 4	Grade 8
Number Properties and Operations	40%	20%
Measurement	20%	15%
Geometry	15%	20%
Data Analysis and Probability	10%	15%
Algebra	15%	30%

and algebra. Table 2 provides details regarding the distribution of items comprising the composite score for the grade four and eight assessments.

Reading

The NAEP Reading Framework (2006) provides guidelines and a theoretical basis for reading assessment. This framework is designed with the input of individuals and organizations involved in reading education including researchers, policymakers, teachers, and business representatives. However, a particular emphasis is placed on the work of the National Institute for Child Health and Human Development (NICHD). More specifically, the NICHD summarizes how the research describes a reader as:

In the cognitive research, reading is purposeful and active. According to this view, a reader reads a text to understand what is read, to construct memory representations of what is understood, and to put this understanding to use. (p. 4, NICHD, 2000, as cited in National Assessment Governing Board, 2006b)

Moreover, reading is considered to be a complex process rather than a simple set of skills. As such, the NAEP reading assessment is designed such that comprehension is defined as:

“[I]ntentional thinking during which meaning is constructed through interactions between text and reader” (Harris & Hodges, 1995). Thus, readers derive meaning from text when they engage in intentional, problem solving thinking processes. (p. 14, NICHD, 2000, as cited in National Assessment Governing Board, 2006b)

Given this framework, NAEP provides an excellent tool for evaluating overall reading achievement, but not to diagnosis specific individuals.

The NAEP reading assessment is designed to account for three reading contexts: reading for literacy experience, reading for information, and reading to perform a task. Within these contexts, four aspects of reading are considered: forming a general understanding, developing interpretation, making reader/text connections, and examining content and structure. The reading assessment is

administered by supplying students with booklets that contain reading materials and comprehension questions. The questions consist of both multiple-choice and constructed-response question formats with at least half of the questions being of the constructed-response type.

Analysis

Phase I

Propensity score analysis (PSA; ?, ?) is a statistical method or approach that attempts to adjust for selection bias in observational studies. Most of the studies conducted using PSA involve analysis in two phases where phase one involves the calculation of propensity scores or matching for both treatment and control units of analysis; and phase two involves the comparison of those two groups. However, in situations where data is multilevel, or clustered, special consideration is necessary both at phase I and II. For the NAEP data, the state variable will be used as the level 2 identifier. The algorithm in the `multilevelPSA` package ? (?) will facilitate the multilevel PSA analysis. Specifically, for phase I, three approaches will be used for stratifying students for comparison, namely conditional inference trees ? (?), logistic regression, and matching. For each approach, the stratification procedure will be performed separately for each state so that direct comparisons between students in phase II do not occur between states. That is, students within a stratification or two students being matched must reside in the same state.

Phase II

The second phase of the propensity score analysis involves comparing dependent variables of students with similar propensity scores using standard *t*-tests and reporting corresponding confidence intervals and effect sizes. However, for multilevel data analysis occurs in two states. First, comparisons are made for each state. The results from each state can then be aggregated to provide an overall difference and effect size.

Graphical Representation

Given the large amount of data that needs to be summarized, the use of graphics will be emphasized. The `multilevelPSA` package provides a number of graphing functions that extend the framework introduced by Helmreich and Pruzek for multilevel PSA. Figure 3 represents a multilevel PSA assessment plot. In this graphic, the x-axis corresponds public school grade 8

NAEP scores and the y-axis corresponds to charter school grade 8 NAEP scores. Each colored circle is a state with its size corresponding the number of students within each state. The distribution of differences between charter and public schools across states are represented as tick marks along the diagonal line in the bottom left of the graphic. Differences are aggregated (and weighted by size) across states. For grade 8 math, the overall adjusted mean for charter school students is 281 and the overall adjusted mean for public school student is 278. The dashed blue line parallel to the unit line corresponds to the overall adjusted mean difference and likewise, the dashed green lines correspond to the confidence interval.

Figure 4 provides a more nuanced depiction of the differences both between and across states. Similar to the mutlielvel PSA assessment plot, each blue dot corresponds to a state and is sized relative to the number of students within each state. The light gray dots correspond to each of the strata within each state. The graphic also provides confidence intervals for each state as well as the overall adjusted mean difference and confidence interval.

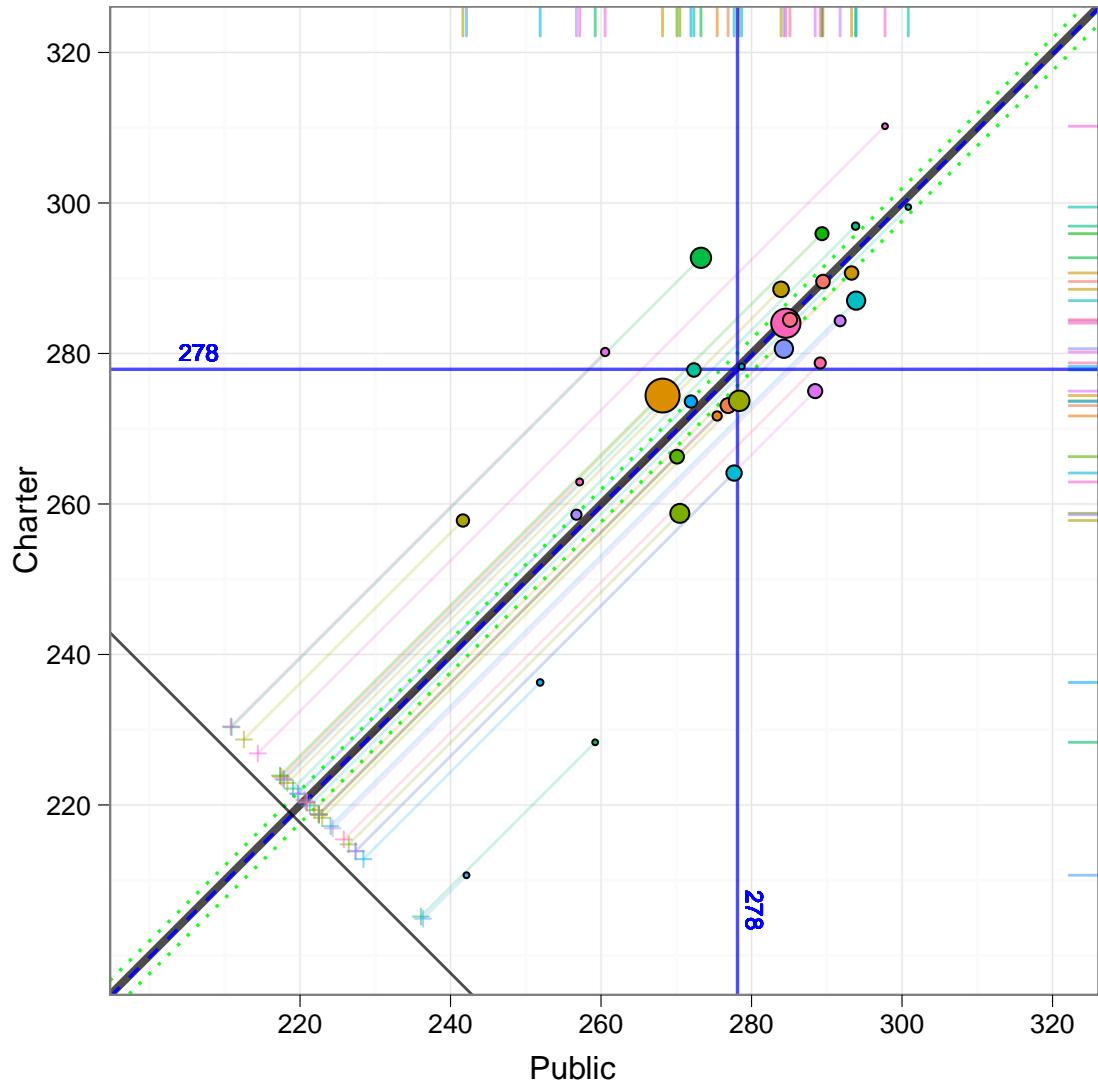


Figure 3: Multilevel PSA Assessment Plot: Grade 8 Math

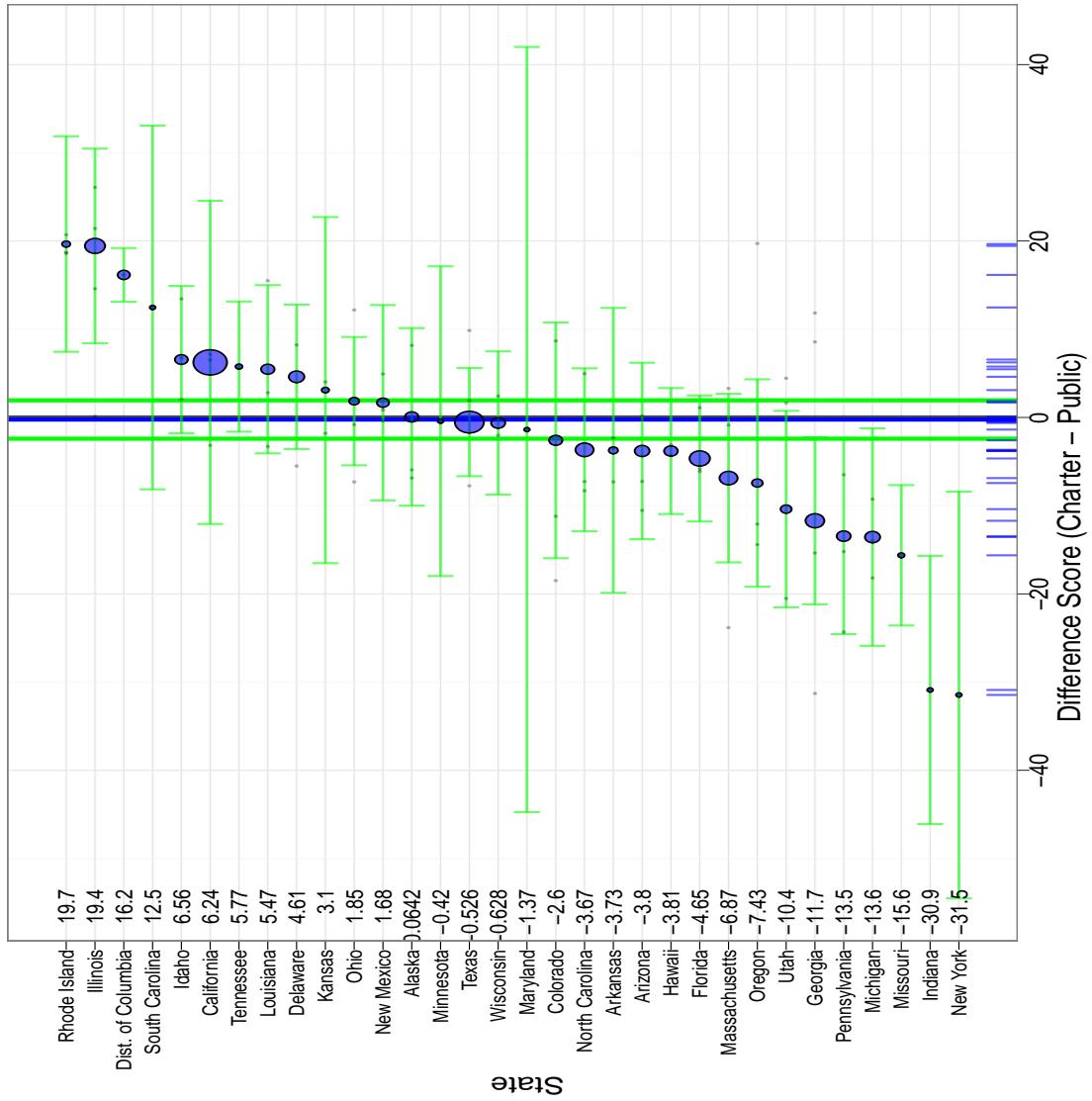


Figure 4: Multilevel PSA Difference Plot: Grade 8 Math

CHAPTER 4: RESULTS

This chapter summarizes the results of the multilevel propensity score analysis.

Missing Data Imputation

Stratification by logistic regression (using two approaches to covariate selection) and matching require a complete dataset to estimate the models. As such, missing data was imputed using multivariate imputation by chained equations van Buuren and Groothuis-Oudshoorn (n.d.) vis-à-vis the MICE package ? (?) in R.

Table 3: Descriptive Statistics of Dependent Variables (Unadjusted)

	Charter Schools		Public Schools		Mean Difference	Confidence Interval
	Mean	SD	Mean	SD		
Grade 4						
Math	232	28.2	238	27.7	6.4***	5.5, 7.3
Reading					.***	
Grade 8						
Math					.***	
Reading					.***	

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

Propensity Score Analysis with Stratification

Phase I

Phase II

Table 4: Level 1 Summary Grade 4 Math (CITs)

State	Strata	Public		Charter		Diff
		Mean	n	Mean	n	
AK	2	228.3	1096	224.5	25	-3.8
AK	4	210.5	16	267.3	7	56.8
AK	5	246.9	1384	253.6	70	6.7
AR	1	237.4	2776	228.6	16	-8.9
AZ	2	240.4	1185	237.4	143	-3.0
AZ	3	220.2	1651	215.6	83	-4.7
CA	3	219.5	2802	217.2	79	-2.3
CA	4	234.4	3850	231.3	55	-3.1
CA	9	219.4	498	225.0	35	5.6
CO	10	182.0	10	148.2	1	-33.9

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State	Strata	Public		Charter		Diff
		Mean	n	Mean	n	
CO	11	228.7	954	245.5	13	16.8
CO	4	230.8	7	210.2	3	-20.6
CO	5	241.2	378	244.5	30	3.3
CO	6	255.9	1127	258.0	81	2.1
CO	9	226.3	74	214.3	4	-11.9
CT	3	233.4	572	224.5	7	-8.9
CT	5	222.7	327	214.7	19	-8.0
DC	3	216.9	31	226.8	12	9.9
DC	4	249.1	263	244.6	36	-4.6
DC	7	212.2	546	212.7	208	0.5
DC	8	208.4	112	208.7	22	0.3
DC	9	213.9	330	217.9	234	4.0
DE	2	229.0	929	230.4	107	1.4
DE	4	251.6	615	255.3	56	3.7
DE	5	241.5	1042	246.4	32	4.9
FL	10	258.6	680	258.1	29	-0.5
FL	11	244.0	377	238.9	38	-5.0
FL	2	233.0	2780	233.1	69	0.1
FL	4	247.4	483	245.0	16	-2.4
FL	6	242.5	191	246.2	11	3.7
FL	9	247.5	20	247.0	3	-0.5
GA	2	221.7	2354	231.7	77	10.0
GA	4	254.0	152	261.1	5	7.1
GA	6	233.3	358	236.3	23	3.0
GA	7	255.2	1001	255.7	59	0.5
HI	2	245.1	1558	236.3	35	-8.8
HI	4	226.0	255	226.0	8	0.1
HI	5	223.7	882	220.3	14	-3.4
ID	2	246.4	1746	255.5	52	9.1
ID	4	212.7	139	231.0	2	18.3
ID	5	236.1	1139	259.7	6	23.6
IL	2	197.4	97	210.1	6	12.7
IL	4	214.5	1041	218.6	37	4.1
IL	6	252.6	1475	253.8	8	1.3
IL	7	228.5	1446	242.3	27	13.7
IN	2	222.6	296	219.0	8	-3.6
IN	3	245.3	2466	232.3	5	-13.0
KS	2	227.3	324	233.8	7	6.5
KS	3	248.3	2616	251.3	21	3.0
LA	1	229.2	2830	230.8	65	1.6
MA	2	239.5	986	229.7	37	-9.8
MA	4	234.7	654	226.0	12	-8.6
MA	6	257.5	1952	234.0	2	-23.5
MD	11	234.1	364	226.0	8	-8.1
MD	12	236.5	168	232.6	10	-3.9
MD	13	258.5	1209	270.7	10	12.3
MD	4	223.0	324	217.6	22	-5.3

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State	Strata	Public		Charter		Diff
		Mean	n	Mean	n	
MD	5	233.7	379	229.4	6	-4.3
MD	7	223.9	728	210.4	84	-13.4
MD	8	208.4	77	214.0	1	5.7
MI	11	173.2	3	205.9	3	32.7
MI	12	229.2	652	235.3	19	6.2
MI	13	216.5	9	207.7	5	-8.8
MI	2	204.1	981	210.8	144	6.7
MI	4	249.3	1384	246.3	18	-3.0
MI	7	211.2	97	209.9	5	-1.4
MI	8	221.8	78	234.2	21	12.4
MN	10	250.7	2150	253.5	39	2.8
MN	11	253.1	594	259.2	33	6.1
MN	3	248.4	172	243.1	3	-5.3
MN	6	220.0	83	249.1	2	29.1
MN	7	226.0	180	231.7	21	5.7
MN	8	221.1	25	224.0	11	2.9
NC	3	242.3	18	236.9	3	-5.4
NC	4	247.3	6	258.2	22	10.9
NC	6	254.6	2115	251.5	58	-3.1
NC	7	231.9	2181	230.5	13	-1.4
NH	4	255.1	14	224.4	3	-30.7
NJ	3	223.6	223	220.3	54	-3.3
NJ	4	237.7	161	226.5	5	-11.2
NJ	5	250.2	2396	237.4	15	-12.8
NM	1	230.3	2783	240.7	44	10.4
NV	2	222.3	24	240.5	10	18.2
NV	3	235.0	2953	229.5	62	-5.5
NY	2	225.6	851	230.2	57	4.6
NY	3	243.3	3146	220.8	3	-22.5
OH	2	214.2	901	218.2	112	4.0
OH	4	222.4	231	198.9	6	-23.5
OH	5	248.8	2192	236.9	6	-11.9
OK	2	222.6	284	220.2	15	-2.3
OR	3	242.5	1330	242.1	26	-0.4
OR	4	225.6	405	252.7	7	27.1
OR	5	235.4	1047	247.2	15	11.8
PA	3	223.0	1449	231.2	17	8.2
PA	4	227.4	393	237.2	17	9.8
PA	6	255.1	1550	249.4	9	-5.7
PA	7	232.0	192	235.4	7	3.4
RI	2	218.8	633	224.9	58	6.1
RI	3	246.3	1771	247.6	21	1.3
TX	2	248.7	242	245.4	15	-3.3
TX	4	243.5	2423	222.9	12	-20.6
TX	5	235.2	3528	229.5	64	-5.7
UT	3	221.0	321	241.4	2	20.4
UT	4	241.2	2795	244.8	104	3.6

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State	Strata	Public		Charter		Diff
		Mean	n	Mean	n	
UT	5	253.7	29	250.1	91	-3.6
WI	2	248.8	2283	257.6	31	8.8
WI	4	222.4	238	227.4	38	5.0
WI	5	219.9	1173	217.6	67	-2.3
WY	1	242.1	1986	247.9	6	5.8

Table 6: Grade 4 Math Descriptive Statistics

		Traditional	Charter	
SEX				
Male		84262	52%	1840
Female		79311	48%	1859
Unknown		32	0%	1
SRACE				
White		92118	56%	1214
Black		28663	18%	1579
Hispanic		28887	18%	670
Asian Amer/Pacif Is		7837	5%	173
Amer Ind/Alaska Nat		3876	2%	36
Other		2224	1%	28
Unknown		0	0%	0
SLUNCH1				
Eligible		82036	50%	2132
Not eligible		80629	49%	1397
Info not available		940	1%	171
Unknown		0	0%	0
SD4				
Yes, IEP		21630	13%	394
Yes, 504 plan		1453	1%	26
Yes, 504 in process		0	0%	0
Not IEP		140490	86%	3280
Omitted		0	0%	0
Unknown		32	0%	0
ELL3				
Yes		13887	8%	292
No		146473	90%	3331
Formerly ELL		3208	2%	77
Omitted		0	0%	0
Unknown		37	0%	0
SDELL				
Student with disabi		21229	13%	386
English language le		12033	7%	258
Both SD and ELL		1854	1%	34
Neither SD nor ELL		128441	79%	3022
Unknown		48	0%	0

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	Charter	Traditional	
	IEP		
Student with disabi	23083	14%	420
Not student with di	140490	86%	3280
Omitted	32	0%	0
Unknown	0	0%	0%

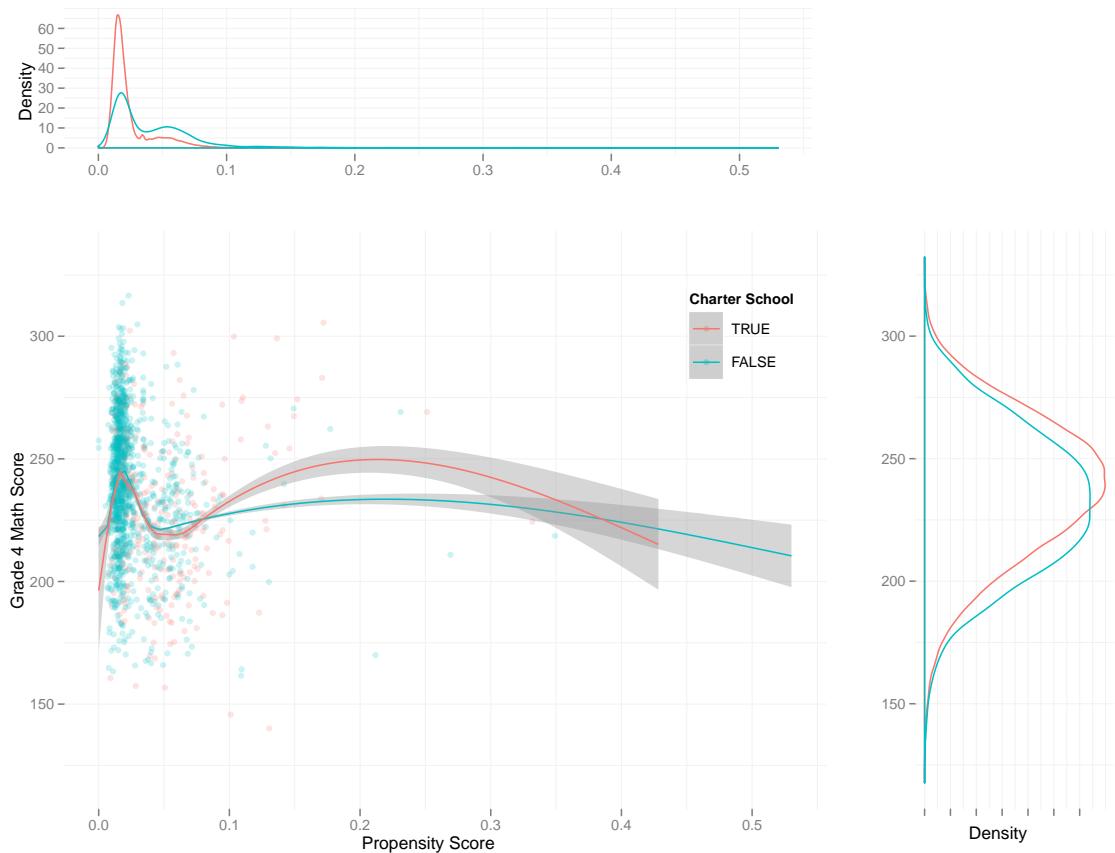


Figure 5: Loess Regression Assessment Plot: Grade 4 Math

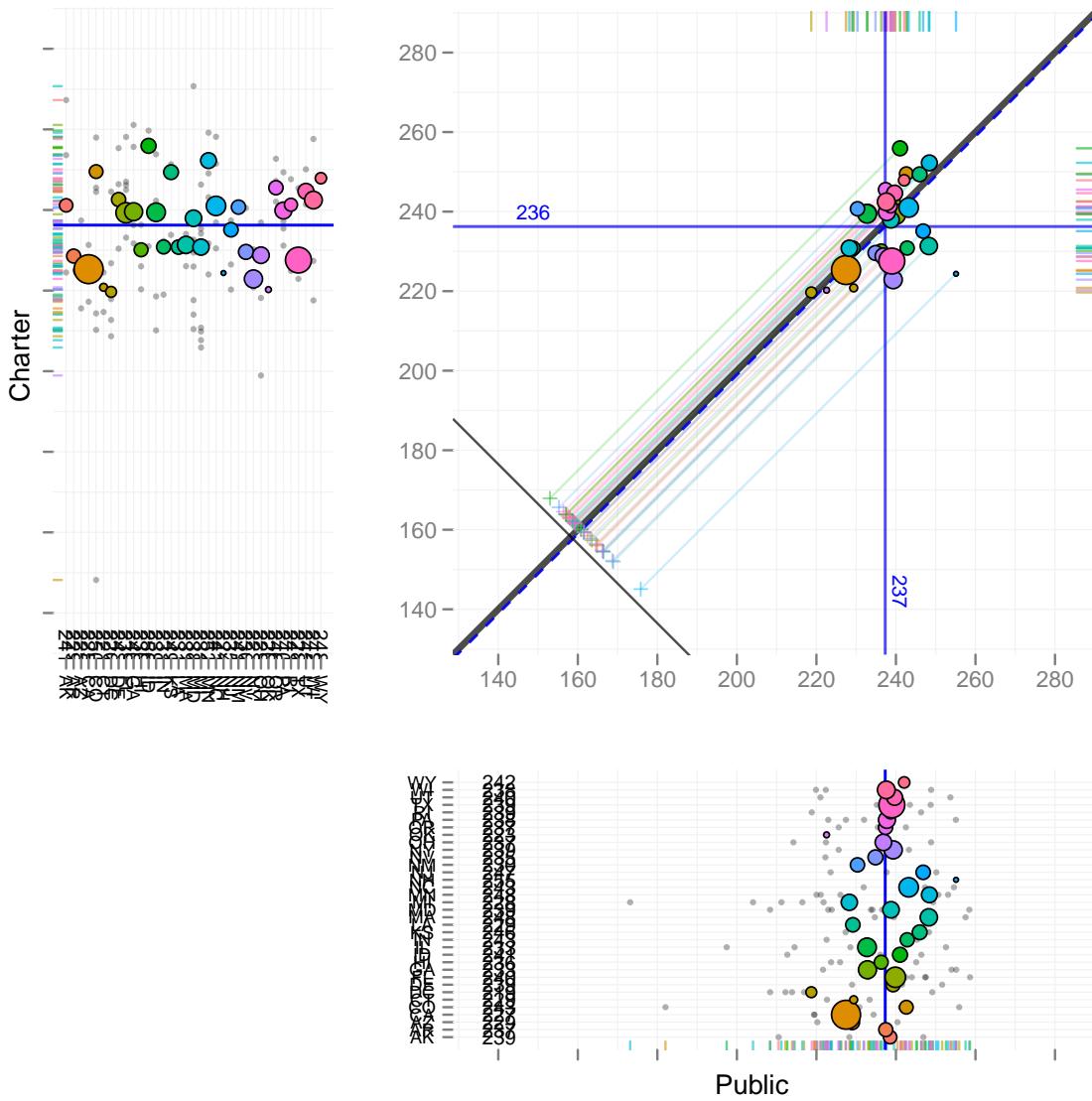


Figure 6: Multilevel PSA Assessment Plot: Grade 4 Math

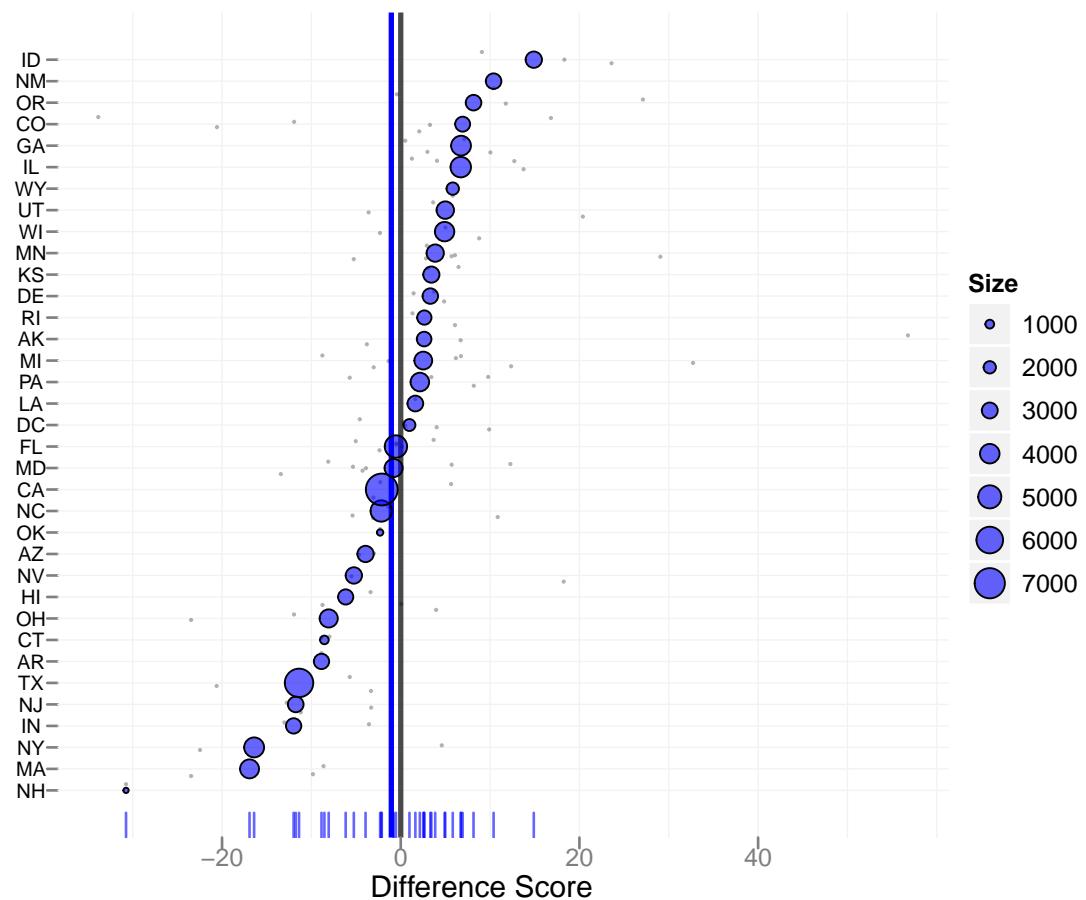


Figure 7: Multilevel PSA Difference Plot: Grade 4 Math

State	Public		Charter		Diff
	Mean	n	Mean	n	
AK	238.5	2496.0	241.2	102.0	2.6
AR	237.4	2776.0	228.6	16.0	-8.9
AZ	229.0	2836.0	225.0	226.0	-3.9
CA	227.4	7150.0	225.3	169.0	-2.1
CO	242.6	2550.0	249.5	132.0	6.9
CT	229.4	899.0	220.8	26.0	-8.5
DC	218.7	1282.0	219.7	512.0	1.0
DE	239.3	2586.0	242.6	195.0	3.3
FL	239.9	4531.0	239.3	166.0	-0.5
GA	232.8	3865.0	239.6	164.0	6.7
HI	236.3	2695.0	230.1	57.0	-6.2
ID	241.0	3024.0	255.9	60.0	14.9
IL	232.7	4059.0	239.4	78.0	6.7
IN	242.8	2762.0	230.8	13.0	-12.0
KS	246.0	2940.0	249.4	28.0	3.4
LA	229.2	2830.0	230.8	65.0	1.6
MA	248.3	3592.0	231.4	51.0	-16.9
MD	238.8	3249.0	238.0	141.0	-0.8
MI	228.3	3204.0	230.8	215.0	2.5
MN	248.4	3204.0	252.3	109.0	3.9
NC	243.2	4320.0	241.0	96.0	-2.2
NH	255.1	14.0	224.4	3.0	-30.7
NJ	246.9	2780.0	235.1	74.0	-11.8
NM	230.3	2783.0	240.7	44.0	10.4
NV	234.9	2977.0	229.6	72.0	-5.2
NY	239.3	3997.0	222.9	60.0	-16.4
OH	236.8	3324.0	228.8	124.0	-8.1
OK	222.6	284.0	220.2	15.0	-2.3
OR	237.4	2782.0	245.5	48.0	8.1
PA	237.7	3584.0	239.9	50.0	2.1
RI	238.7	2404.0	241.3	79.0	2.6
TX	239.0	6193.0	227.6	91.0	-11.4
UT	239.7	3145.0	244.6	197.0	5.0
WI	237.6	3694.0	242.5	136.0	4.9
WY	242.1	1986.0	247.9	6.0	5.8

Table 5: Level 2 Summary Grade 4 Math (CITs)

Table 7: Summary Propensity Score Analysis using Stratification

	Adjusted Mean		\bar{x}		n	95% CI
	Public	Charter	Diff	ATE		
Grade 4 Math						
Logistic Regression	237.95	237.38	-0.57	-0.57	146656.00	-1.72 0.57
Logistic Regression Step AIC	237.96	237.35	-0.60	-0.60	146656.00	-1.73 0.52
Conditional Inference Trees	237.93	238.27	0.34	0.34	146638.00	-0.96 1.64
Grade 4 Reading						
Logistic Regression	218.27	218.96	0.70	0.70	141352.00	-0.71 2.11
Logistic Regression Step AIC	218.26	219.22	0.96	0.96	141352.00	-0.44 2.37
Conditional Inference Trees	218.26	219.01	0.75	0.75	141340.00	-0.62 2.12
Grade 8 Math						
Logistic Regression	278.77	279.10	0.33	0.33	97563.00	-1.40 2.06
Logistic Regression Step AIC	278.77	279.54	0.77	0.77	97563.00	-0.91 2.46
Conditional Inference Trees	278.72	280.89	2.17	2.17	97521.00	0.36 3.98
Grade 8 Reading						
Logistic Regression	259.80	262.82	3.02	3.02	105486.00	1.55 4.49
Logistic Regression Step AIC	259.80	262.67	2.87	2.87	105486.00	1.36 4.38
Conditional Inference Trees	259.75	265.39	5.65	5.65	105468.00	4.36 6.93

Propensity Score Matching

Phase I

Phase II

Table 8: Summary of Propensity Score Matching

M	Charter	Public	Diff	ES	95% CI
Grade 4 Math					
1	233.10	231.92	1.17	0.04	-0.01 2.36
5	233.94	232.88	1.06***	0.04	0.53 1.60
10	235.58	234.40	1.18***	0.04	0.79 1.57
Grade 4 Reading					
1	213.33	212.09	1.24	0.04	-0.26 2.74
5	214.35	213.06	1.29***	0.04	0.60 1.99
10	215.89	214.45	1.44***	0.04	0.93 1.95
Grade 8 Math					
1	273.64	269.94	3.70***	0.10	2.11 5.29
5	276.14	272.56	3.58***	0.10	2.83 4.34
10	277.42	274.11	3.31***	0.09	2.75 3.87
Grade 8 Reading					
1	259.93	254.63	5.30***	0.16	3.92 6.68
5	261.50	255.63	5.87***	0.17	5.21 6.52
10	262.22	256.76	5.46***	0.16	4.97 5.94

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

Multilevel Propensity Score Analysis

Phase I

Phase II

Table 9: Summary of Multilevel PSA

	Adjusted Mean		Diff	ATE	n	95% CI	
	Public	Charter				Grade 4 Math	
Logistic Regression	236.51	236.55	3.40	0.04	83241	-1.50	1.58
Logistic Regression Step AIC	237.25	236.83	4.22	-0.41	95290	-2.05	1.23
Conditional Inference Trees	236.70	237.78	3.89	1.10	118812	-0.26	2.54
Grade 4 Reading							
Logistic Regression	217.14	216.87	4.65	-0.27	80465	-2.29	1.75
Logistic Regression Step AIC	217.05	217.46	4.71	0.41	86885	-1.52	2.33
Conditional Inference Trees	216.09	220.92	5.99	4.83	108938	2.91	6.75
Grade 8 Math							
Logistic Regression	278.13	277.90	5.31	-0.23	61795	-2.41	1.94
Logistic Regression Step AIC	278.62	280.52	6.07	1.90	69535	-0.33	4.13
Conditional Inference Trees	277.61	281.11	5.28	3.50	80594	1.48	5.52
Grade 8 Reading							
Logistic Regression	258.97	263.19	4.14	4.22	71270	2.45	5.99
Logistic Regression Step AIC	259.25	263.61	4.25	4.36	77513	2.58	6.14
Conditional Inference Trees	258.10	264.97	4.37	6.87	84352	5.12	8.63

Graphical Representations of Multilevel PSA

CHAPTER 5: DISCUSSION

Given the significant difference in sample n 's for charter and public schools (i.e. there are as much as three to four orders of magnitude more public schools students available in the NAEP data sets), it is expected that there would be public school students who would not have a counterpart from the charter school group. However, the relatively high percentage of public schools students who do not have a charter school counterpart (as much as 35%) suggest that there may be imbalance between the two groups as a whole. That is, although reasonable balance was achieved with regard to the individual strata where comparisons are made, the overall sample imbalance, as evidenced by the unmatched public school students, suggests that public schools serve a more heterogeneous population.

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Appendix A

Charter Schools & Student Enrollment by State

Table 10: Charter Schools & Student Enrollment by State

State	Law Enacted	Totals for Charter Schools ^b			NAEP Students	
		Operating	Closed	Students	Charters	Publics
Alabama ^a		0	0	0	0	2759
Alaska	1995	26	5	5,198	69	2517
Arizona	1994	510	96	119,903	99	2674
Arkansas	1995	25	6	6,750	30	2407
California	1992	802	103	316,468	417	7803
Colorado	1993	151	10	54,497	108	2598
Connecticut	1996	21	5	3,932	0	2531
Delaware	1995	21	2	8,740	180	2641
Washington DC	1996	93	16	25,385	652	1336
Florida	1996	382	82	108,382	175	3876
Georgia	1993	83	5	40,807	64	3465
Hawaii	1994	32	0	7,317	132	2605
Idaho	1998	32	1	10,492	59	2784
Illinois	1996	74	8	27,683	33	4015
Indiana	2001	50	2	12,631	11	2720
Iowa	2002	10	0	1,462	0	2839
Kansas	1994	40	10	3,361	17	2726
Kentucky ^a		0	0	0	0	2696
Louisiana	1995	66	10	23,634	97	2264
Maine ^a		0	0	0	0	2658
Maryland	2003	34	2	7,301	6	2825
Massachusetts	1993	64	6	23,905	56	3667
Michigan	1993	250	27	94,092	134	2480
Minnesota	1991	159	29	28,371	16	2875
Mississippi	1997	1	0	367	0	2613
Missouri	1998	39	5	13,125	38	2771
Montana ^a		0	0	0	0	2581
Nebraska ^a		0	0	0	0	2688
Nevada	1997	26	7	7,295	0	2662
New Hampshire	1995	11	2	1,212	0	2803
New Jersey	1996	64	19	17,986	0	2813
New Mexico	1993	70	3	11,426	54	2722
New York	1998	118	10	32,602	16	3745
North Carolina	1996	103	32	30,445	72	4090
North Dakota ^a		0	0	0	0	2307
Ohio	1997	293	48	94,171	45	3746
Oklahoma	1999	14	1	4,770	0	2612
Oregon	1999	93	8	13,612	41	2626
Pennsylvania	1997	133	12	61,823	64	2709
Rhode Island	1995	11	0	2,894	30	2621
South Carolina	1996	36	10	8,705	16	2697
South Dakota ^a		0	0	0	0	2889

Charter Schools & Student Enrollment by State (cont.)

State	Law Enacted	Totals for Charter Schools ^b			NAEP Students	
		Operating	Closed	Students	Charters	Publics
Tennessee	2002	14	1	2,585	54	2815
Texas	1995	331	33	108,541	199	7070
Utah	1998	68	1	23,233	38	2722
Vermont ^a		0	0	0	0	2003
Virginia	1998	4	3	275	0	2848
Washington ^a		0	0	0	0	2968
West Virginia ^a		0	0	0	0	2831
Wisconsin	1993	221	37	41,799	114	2592
Wyoming	1995	3	0	244	0	1897
Total		4,578	657	1,407,421	3,164	156,963

^aState currently does not have a charter school law.

^bSource: Center for Education Reform (2010)

Appendix B

Thematic Map of Number of Charter Schools by State in 2008

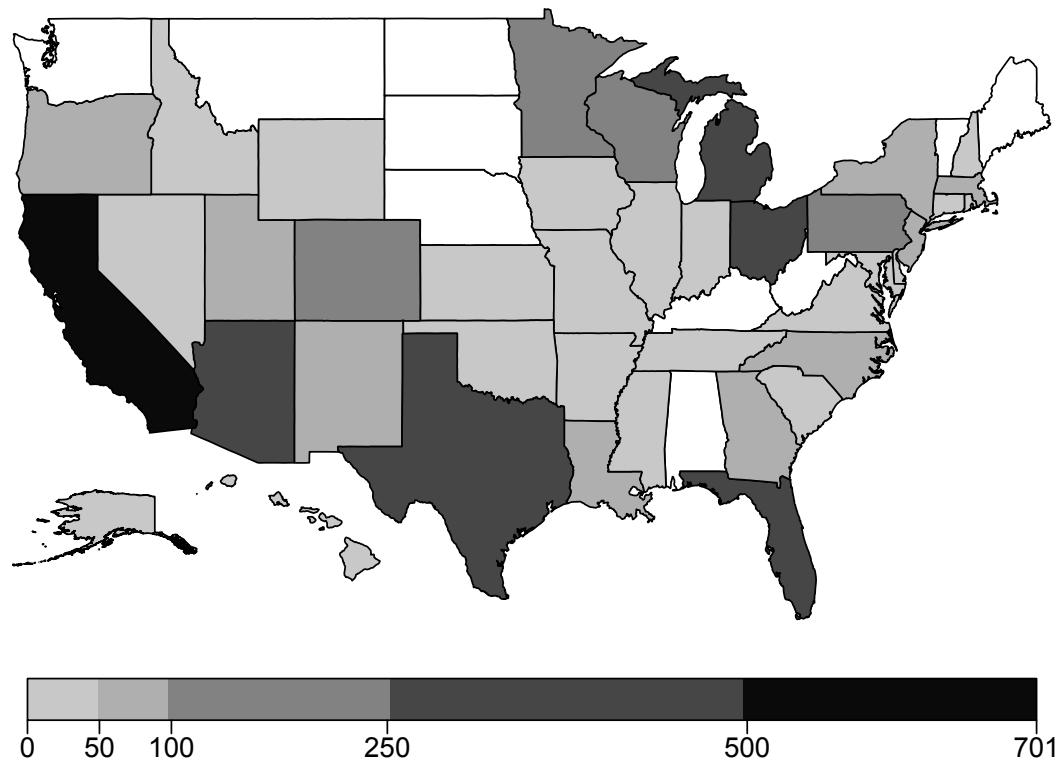


Figure 8: Thematic Map of Number of Charter Schools by State in 2008

Appendix C

NAEP Student Background Questionnaire

Core Questions

- Are you Hispanic or Latino? [No, I am not Hispanic or Latino; Yes, I am Mexican, Mexican American, or Chicano; Yes, I am Puerto Rican or Puerto Rican American; Yes, I am Cuban or Cuban American; Yes, I am from some other Hispanic or Latino background]
- Which of the following best describes you? [White; Black or African American; Asian; American Indian or Alaska Native; Native Hawaiian or other Pacific Islander]
- Does your family get a newspaper at least four times a week?
- Does your family get any magazines regularly?
- About how many books are there in your home?
- Is there a computer at home that you use?
- Is there an encyclopedia in your home? It could be a set of books, or it could be on the computer.
- About how many pages a day do you have to read in school and for homework?
- How often do you talk about things you have studied in school with someone in your family?
- How many days were you absent from school in the last month?
- How far in school did your mother go? [Grade 8 Only]
- How far in school did your father go? [Grade 8 Only]
- How often do people in your home talk to each other in language other than English?

Grade 4 Math Related Questions

- Use computer at school for math
- Use computer to practice or drill on math
- Use computer to play math games
- Kind of calculator you normally use
- Use calculator for math tests-student
- Difficulty of this math test
- Effort on this math test
- Importance of success on this math test
- The math work is too hard
- I have done a good job on my homework
- I have done a good job in class
- The math work is too easy
- I like what we do in math class

Grade 4 Reading Related Questions

- Learn a lot when reading books
- Reading is a favorite activity
- Writing stories or letters is a favorite activity
- Writing helps share ideas
- Read for fun on own
- Talk with friends about what you read
- Write e-mails to friends or family
- Read stories or poems for fun
- Read to learn about real things
- Read stories on Internet for fun
- Class discussion about something class has read
- Work in groups to talk about something read
- Write in journal about something read
- Write a book report
- Make presentation to class about something read
- Do school project about something read
- Read books or magazines for reading
- Read books or magazines for science
- Read books or magazines for social studies/history
- Read books or magazines for math
- Write long answers on reading tests
- Read own books for reading assignment
- Difficulty of this reading test
- Effort on this reading test
- Importance of success on this reading test

Grade 8 Math Related Questions

- Use computer at school for math
- Use computer to practice or drill on math
- Use computer to play math games
- Kind of calculator you normally use
- Use calculator for math tests-student
- Difficulty of this math test
- Effort on this math test
- Importance of success on this math test
- Time per day on computer for math work
- Use spreadsheet program for math assignments
- Use program to drill on math facts
- Use program for new lessons on problem-solving
- Use Internet to learn things for math class
- Use calculator program for math class
- Using graphing program for charts for math class
- Use statistical program for math class
- Use word processing program for math class
- Use drawing program for math class
- Use basic four-function calculator in math class
- Use scientific calculator in math class
- Use graphing calculator in math class
- Have clear understanding what teacher asking to do
- The math work is too easy
- The math work is boring
- I have done a good job on my homework
- I have done a good job on my classwork
- The math work is challenging
- The math work is engaging and interesting
- I am learning

Grade 8 Reading Related Questions

- Write long answers on reading tests
- Learn a lot when reading books
- Reading is a favorite activity
- Writing stories or letters is a favorite activity
- Writing helps share ideas
- Read for fun on own
- Talk with friends about what you read
- Write e-mails to friends or family
- Read comic books or joke books outside school
- Read fiction books or stories outside school
- Read plays outside school
- Read poems outside school
- Read biographies/autobiographies outside school
- Read books on science outside school
- Read books on technology outside school
- Read books on other countries outside school
- Read books on history outside school
- Read other non-fiction books outside school
- Read newspaper articles or stories outside school
- Read magazine articles or stories outside school
- Read Internet articles or stories outside school
- Class discussion about something class has read
- Work in groups to talk about something read
- Write in journal about something read
- Write report or paper about something read
- Make presentation to class about something read
- Done project about something read
- Read other than textbook for English class
- Read other than textbook for science class
- Read other than textbook for social studies class

- Read other than textbook for math class
- Explain understanding of what you read
- Discuss interpretation of what you read
- Difficulty of this reading test
- Effort on this reading test
- Importance of success on this reading test

Appendix D

Descriptive Statistics

Table 11: Descriptive Statistics: Grade 4 Math Student Variables

	Public Schools	Charter Schools	
gender			
Male	72662	51%	1681
Female	70622	49%	1666
Unknown	35	0%	0
race			
White	78078	54%	1207
Black	24605	17%	1376
Hispanic	28206	20%	577
Asian American	7515	5%	96
American Indian	3108	2%	47
Other	1807	1%	44
Unknown	0	0%	0
iep			
Yes	16607	12%	311
No	126697	88%	3036
Unknown	15	0%	0
ell			
Yes	16091	11%	252
No	127200	89%	3095
Unknown	28	0%	0
lunch			
Not eligible	74755	52%	1393
Reduced	9728	7%	197
Free	57825	40%	1582
Unknown	1011	1%	175
books			
0-10	17170	12%	405
11-25	30527	21%	684
26-100	46980	33%	1061
>100	45043	31%	1083
Unknown	3599	3%	114
birthyear			
1993	40	0%	0
1994	289	0%	7
1995	3914	3%	70
1996	51306	36%	1033
1997	87408	61%	2205
1998	251	0%	29
1999	108	0%	3
2000	3	0%	0
Unknown	0	0%	0
newspapers			
yes	44064	31%	1003
			30%

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	Charter Schools	Public Schools	
no	46298	32%	1143
Unknown	52957	37%	1201
magazines			
yes	84482	59%	1930
no	31141	22%	701
Unknown	27696	19%	716
computer			
yes	119361	83%	2810
no	19877	14%	411
Unknown	4081	3%	126
encyclopedia			
yes	72434	51%	1761
no	23257	16%	490
Unknown	47628	33%	1096
pagesread			
<5	29967	21%	800
5-10	26429	18%	678
11-15	19560	14%	449
16-20	20369	14%	447
>20	43341	30%	858
Unknown	3653	3%	115
talkstudies			
Never	25156	18%	604
1-2 per month	18463	13%	431
1 per week	16051	11%	359
2-3 times per week	28174	20%	553
Every day	51862	36%	1288
Unknown	3613	3%	112
daysabsent			
None	69196	48%	1504
1-2	42220	29%	949
3-4	17372	12%	461
5-10	7004	5%	174
>10	3943	3%	149
Unknown	3584	3%	110
langinhome			
Never	71636	50%	1569
Once in a while	31552	22%	785
Half the time	10935	8%	296
All or most of the time	25557	18%	588
Unknown	3639	3%	109

Table 12: Descriptive Statistics: Grade 4 Math Scores by State

	Charter Schools					Public Schools						
	n	mean	sd	median	min	max	n	mean	sd	median	min	max
Overall	3347	233.09	28.81	234.25	127.15	313.10	143319	238.04	27.94	239.86	105.92	336.74
Alaska	96	248.66	28.59	252.18	171.68	310.14	2861	238.77	28.86	241.24	132.44	315.60
Arizona	244	233.47	28.73	235.46	127.15	296.09	3294	231.87	30.99	233.85	105.92	327.46
Arkansas	20	245.97	21.14	248.87	196.54	276.03	3087	237.70	26.85	239.32	134.61	305.83
California	276	226.95	29.27	228.80	160.57	296.81	9602	227.17	31.72	228.37	114.90	327.37
Colorado	176	251.14	24.70	254.54	173.59	303.78	3195	239.46	28.61	241.33	117.05	322.84
Connecticut	9	241.58	20.00	238.28	218.62	275.62	3198	243.22	28.31	245.82	108.81	325.12
Delaware	186	237.21	20.66	238.58	180.13	290.34	3111	242.21	23.41	242.86	161.25	313.35
Dist. of Columbia	376	214.20	27.89	215.33	132.74	294.06	1560	213.79	31.95	212.67	124.08	316.65
Florida	216	248.04	20.56	249.88	193.11	288.81	4971	241.68	24.92	242.52	138.45	317.76
Georgia	81	229.24	24.25	230.31	166.06	281.96	4667	231.41	27.24	231.09	128.42	322.00
Hawaii	79	242.36	19.99	244.03	186.62	291.17	3364	234.29	30.00	236.98	118.25	316.46
Idaho	120	257.56	23.91	260.58	184.00	297.52	3464	240.54	25.65	242.24	145.46	310.83
Illinois	91	224.57	19.50	223.46	181.67	271.27	4782	231.36	29.82	231.94	121.28	316.82
Indiana	9	193.44	19.40	194.96	152.18	213.88	3131	245.59	25.00	247.08	120.78	336.74
Iowa	4	230.07	18.44	226.29	212.35	255.36	3023	242.76	24.99	244.53	120.93	315.95
Louisiana	157	236.79	25.71	236.10	178.70	295.55	2886	230.26	25.13	230.64	142.70	302.89
Maryland	22	214.61	19.49	217.25	158.19	257.62	3570	240.68	29.14	241.44	153.03	326.72
Massachusetts	58	232.12	20.78	232.36	182.92	279.23	4084	246.74	26.09	248.13	149.06	320.80
Michigan	342	225.82	28.71	225.91	148.98	298.83	2995	239.41	27.63	242.01	134.29	316.89
Minnesota	33	250.06	23.79	249.35	202.82	304.24	3538	246.26	26.83	248.77	116.79	317.13
Missouri	29	202.01	25.97	200.61	147.55	255.00	3168	240.12	26.02	241.56	146.54	318.74
Nevada	28	226.90	28.63	233.98	147.17	270.87	4005	231.03	28.32	233.32	130.20	312.34
New Hampshire	5	244.07	12.22	246.95	227.90	258.95	3343	248.51	23.91	250.00	147.79	324.29
New Jersey	34	225.05	20.64	221.87	178.65	264.08	3306	248.15	25.70	249.85	157.81	321.31
New Mexico	3	173.61	6.41	171.26	168.71	180.86	3149	228.02	27.68	229.53	126.99	310.59
New York	20	233.30	16.80	231.55	203.43	263.35	4568	240.78	27.02	242.46	122.86	331.88
North Carolina	78	257.74	22.52	259.24	187.51	292.10	5480	240.30	26.37	240.93	124.66	319.32
Ohio	122	223.41	22.45	225.62	166.82	268.12	3720	237.86	28.20	239.37	120.25	311.48
Oklahoma	5	197.63	18.58	192.62	178.83	218.80	3220	237.31	23.71	238.55	124.41	311.19
Oregon	14	239.03	31.96	242.63	173.87	275.80	3486	235.54	27.50	237.30	127.15	314.33
Pennsylvania	98	244.60	29.57	246.79	157.89	296.81	3381	244.27	27.55	247.56	126.32	321.62
Rhode Island	30	230.02	25.71	225.69	177.33	293.88	3070	235.25	27.73	237.93	129.90	303.57
South Carolina	7	233.80	24.04	243.01	203.14	269.53	3560	237.56	28.14	239.44	115.53	316.96
Tennessee	9	211.69	17.60	213.20	187.58	240.25	3237	233.45	26.21	235.39	115.24	311.24
Texas	129	220.51	22.42	218.67	164.33	278.31	8746	239.69	24.51	239.55	128.55	314.11
Utah	76	249.71	25.83	255.54	183.80	294.22	3618	239.43	26.44	242.26	126.79	308.68
Wisconsin	57	220.93	30.40	211.70	153.62	290.65	3170	245.18	26.60	248.06	148.39	319.55
Wyoming	8	274.94	23.59	277.09	244.79	313.10	2709	243.88	23.41	245.60	145.86	318.65

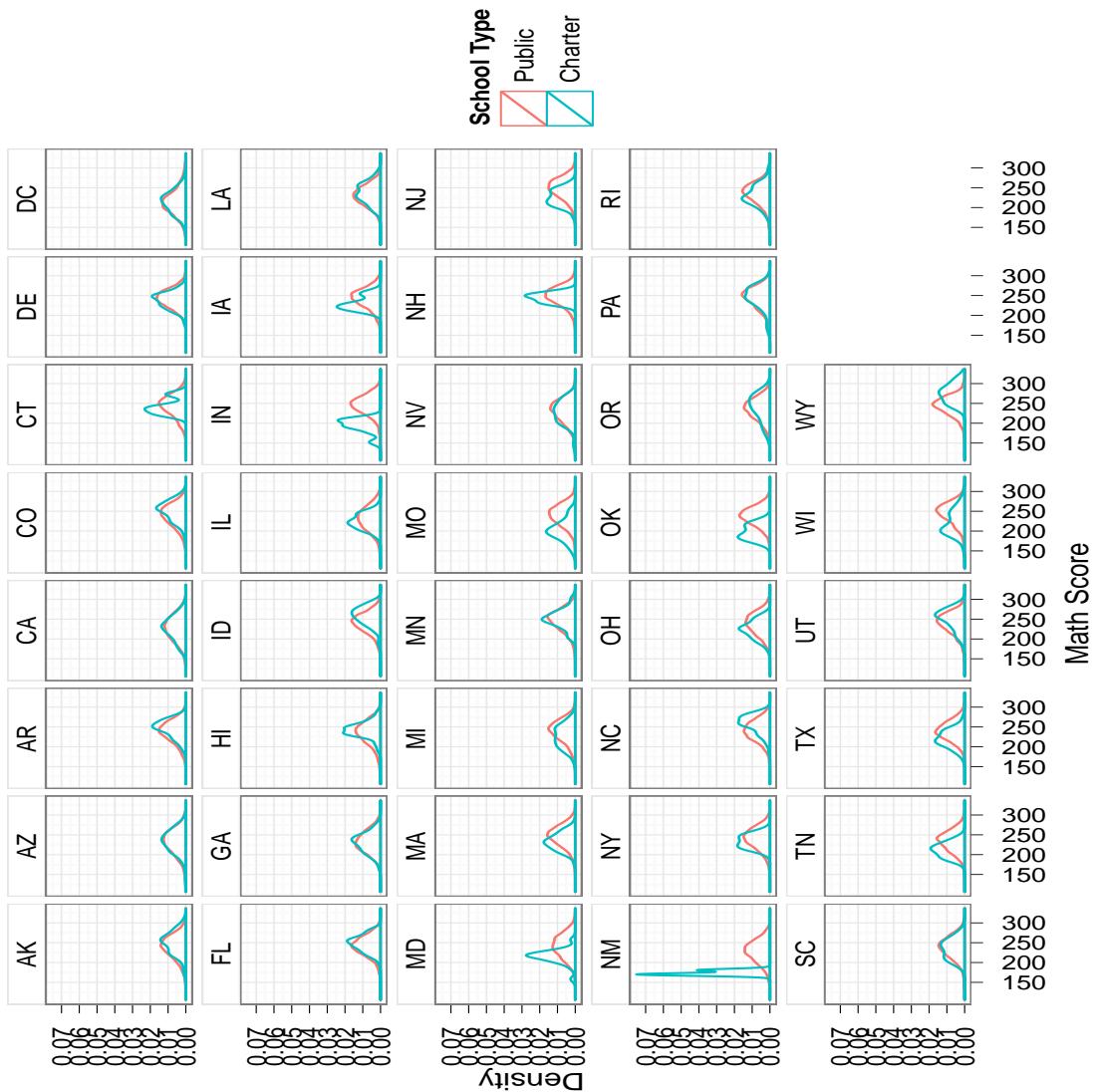


Figure 9: Density Distribution of Grade 4 Math Scores by State

Table 13: Descriptive Statistics: Grade 4 Reading Student Variables

	Public Schools	Charter Schools	
gender			
Male	69744	50%	1558
Female	68367	49%	1666
Unknown	27	0%	0
race			
White	76507	55%	1191
Black	23845	17%	1356
Hispanic	25680	19%	496
Asian American	7348	5%	98
American Indian	3003	2%	33
Other	1755	1%	50
Unknown	0	0%	0
iep			
Yes	13796	10%	291
No	124323	90%	2933
Unknown	19	0%	0
ell			
Yes	13682	10%	212
No	124427	90%	3012
Unknown	29	0%	0
lunch			
Not eligible	73577	53%	1432
Reduced	9253	7%	165
Free	54314	39%	1457
Unknown	994	1%	170
books			
0-10	15421	11%	361
11-25	28530	21%	637
26-100	46537	34%	1078
>100	44149	32%	1033
Unknown	3501	3%	115
birthyear			
1993	40	0%	0
1994	242	0%	8
1995	3519	3%	80
1996	48786	35%	1015
1997	85200	62%	2096
1998	255	0%	25
1999	95	0%	0
2000	1	0%	0
Unknown	0	0%	0
newspapers			
yes	41995	30%	988
no	45023	33%	1058
Unknown	51120	37%	1178
magazines			
yes	81846	59%	1902
			59%

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	Charter Schools	Public Schools	
no	29415	21%	667
Unknown	26877	19%	655
computer			
yes	115312	83%	2678
no	18818	14%	416
Unknown	4008	3%	130
encyclopedia			
yes	70075	51%	1736
no	21501	16%	449
Unknown	46562	34%	1039
pagesread			
<5	28071	20%	751
5-10	25922	19%	677
11-15	19550	14%	442
16-20	19823	14%	379
>20	41158	30%	861
Unknown	3614	3%	114
talkstudies			
Never	23614	17%	499
1-2 per month	17342	13%	402
1 per week	16007	12%	354
2-3 times per week	27394	20%	606
Every day	50169	36%	1251
Unknown	3612	3%	112
daysabsent			
None	66798	48%	1413
1-2	40652	29%	929
3-4	16939	12%	430
5-10	6741	5%	199
>10	3482	3%	140
Unknown	3526	3%	113
langinhome			
Never	69788	51%	1541
Once in a while	30467	22%	758
Half the time	10439	8%	289
All or most of the time	23867	17%	523
Unknown	3577	3%	113

Table 14: Descriptive Statistics: Grade 4 Reading Scores by State

	Charter Schools						Public Schools					
	n	mean	sd	median	min	max	n	mean	sd	median	min	max
Overall	3224	213.37	35.68	215.44	55.76	303.88	138138	218.37	34.11	221.48	41.51	322.14
Alaska	90	232.57	32.70	234.67	141.46	298.40	2794	216.17	35.94	220.80	70.51	309.01
Arizona	229	206.48	32.00	207.47	105.76	274.94	3217	209.76	38.97	214.54	41.51	316.99
Arkansas	14	220.43	24.99	225.84	181.11	265.51	2960	216.97	33.40	220.58	68.69	301.32
California	265	204.01	39.59	203.98	55.76	280.86	9406	204.51	37.39	206.32	46.08	307.50
Colorado	168	237.45	27.98	238.49	144.25	303.88	3130	222.64	33.41	226.19	80.91	304.43
Connecticut	8	208.95	37.10	217.72	139.11	255.92	3084	228.41	34.47	232.59	86.45	315.16
Delaware	180	213.74	26.14	214.14	146.01	275.77	2837	225.45	26.85	226.86	124.05	304.78
Dist. of Columbia	362	194.70	32.91	195.63	111.37	286.02	1428	197.90	36.78	196.54	93.89	322.14
Florida	197	231.71	29.21	236.01	133.95	298.45	4697	223.49	30.65	225.77	88.73	308.63
Georgia	81	218.89	29.48	215.54	159.48	276.90	4417	214.77	30.85	216.45	73.21	321.83
Hawaii	75	237.26	29.00	242.54	138.05	293.40	3321	212.71	34.51	215.16	67.85	314.65
Idaho	113	239.45	27.76	240.76	152.76	301.51	3364	223.40	31.32	226.85	95.46	304.76
Illinois	100	199.81	29.65	199.92	141.14	259.24	4629	212.88	35.84	215.15	83.83	318.13
Indiana	7	182.89	29.70	185.26	138.23	217.83	3121	221.98	31.48	225.47	87.70	301.51
Iowa	4	236.80	26.95	237.14	204.01	268.89	2893	224.77	30.36	228.16	94.11	299.78
Louisiana	158	219.13	36.23	219.05	130.60	300.99	2861	207.93	33.39	210.73	74.08	295.65
Maryland	18	197.50	28.55	192.59	148.29	251.60	3411	225.43	31.82	226.51	92.69	320.36
Massachusetts	61	210.43	27.72	213.29	135.11	266.27	4004	228.55	32.61	230.27	114.62	318.16
Michigan	333	206.13	35.23	208.16	72.20	301.07	2978	222.61	32.50	225.74	91.14	312.77
Minnesota	35	215.75	34.95	221.32	152.80	281.35	3434	224.33	32.84	228.08	72.75	312.22
Missouri	27	185.75	33.31	194.18	114.61	233.59	3212	221.85	31.05	224.13	74.76	309.96
Nevada	22	207.84	47.73	215.88	61.80	273.08	3739	209.93	36.40	213.73	50.01	305.72
New Hampshire	5	253.20	12.47	253.34	233.72	266.28	3231	228.72	30.13	230.74	120.00	310.66
New Jersey	36	209.01	29.48	209.73	156.79	267.93	3133	229.89	31.02	231.89	105.74	317.75
New Mexico	4	198.64	32.63	193.71	167.86	239.27	2871	211.41	34.71	214.25	46.90	302.83
New York	24	202.33	27.65	202.43	144.72	259.85	4407	220.35	34.14	222.99	94.64	312.61
North Carolina	82	238.88	28.83	242.49	163.09	296.54	5386	216.73	33.98	218.93	73.92	320.28
Ohio	108	210.22	30.73	213.13	127.30	296.04	3628	219.41	31.40	221.96	104.75	314.64
Oklahoma	5	183.65	14.21	180.06	170.10	207.73	3106	217.93	31.31	221.44	84.79	298.12
Oregon	15	236.65	21.24	239.85	197.62	274.31	3409	213.90	35.81	218.40	73.13	311.02
Pennsylvania	106	225.31	30.65	225.38	136.80	282.84	3276	227.43	34.67	231.35	77.92	310.19
Rhode Island	27	224.20	27.24	223.81	163.84	277.96	2994	218.22	34.39	221.23	60.14	307.74
South Carolina	6	183.94	54.93	174.77	122.38	264.39	3468	214.46	33.37	216.62	53.84	301.94
Tennessee	10	210.12	18.95	209.72	172.02	239.51	3054	216.38	32.90	218.60	90.86	299.40
Texas	112	197.93	29.24	202.14	118.36	267.24	7858	215.50	32.71	217.06	80.84	313.68
Utah	69	220.25	36.04	222.25	106.79	286.64	3493	221.80	33.49	225.51	67.48	308.62
Wisconsin	60	185.78	47.48	185.81	63.85	291.21	3101	224.70	32.00	227.39	74.55	310.45
Wyoming	8	242.25	10.66	241.09	224.45	261.73	2696	225.21	30.00	228.09	95.23	304.25

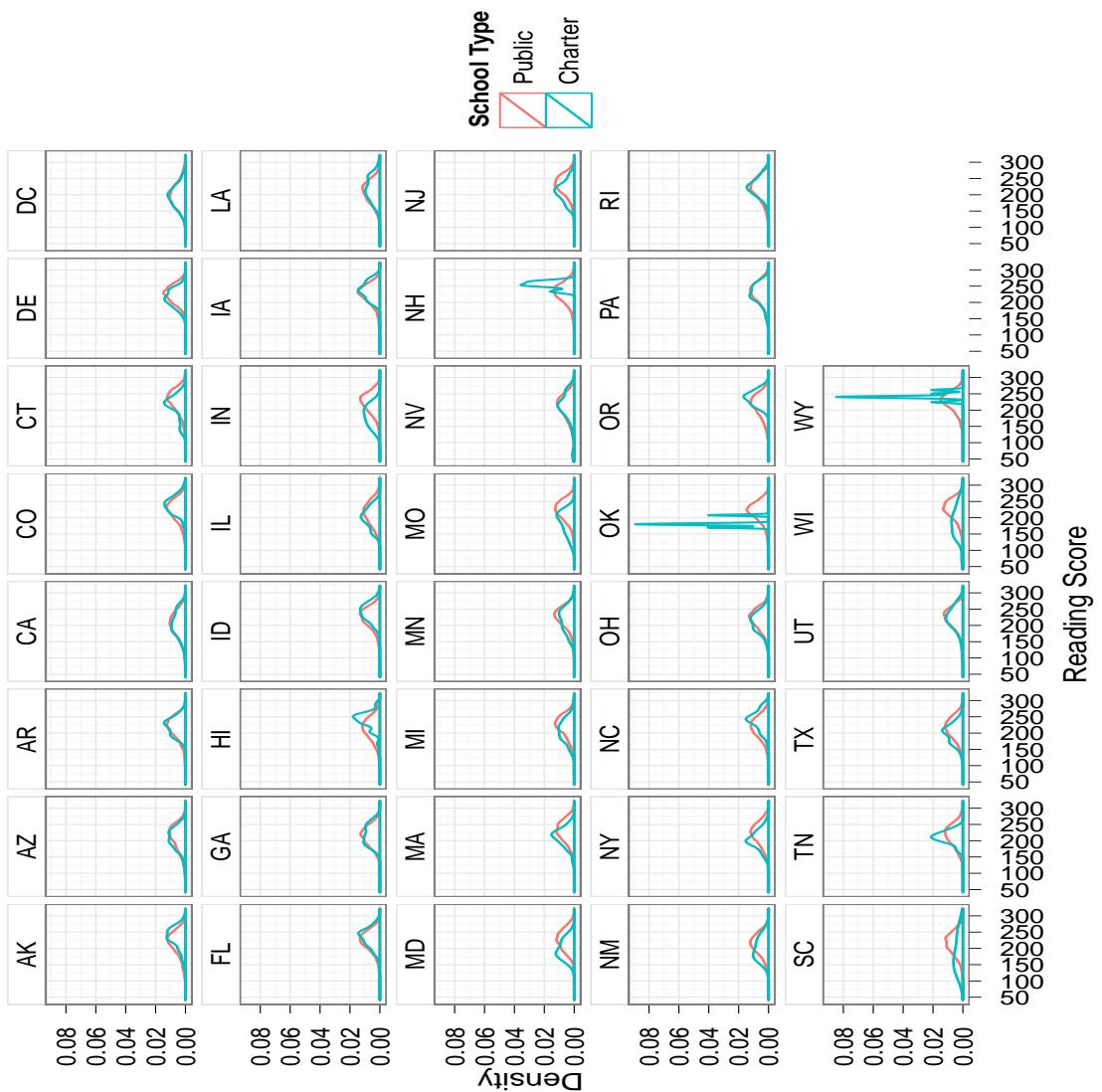


Figure 10: Density Distribution of Grade 4 Reading Scores by State

Table 15: Descriptive Statistics: Grade 8 Math Student Variables

	Public Schools	Charter Schools		
gender				
Male	47630	50%	1436	49%
Female	47023	50%	1468	51%
Unknown	16	0%	0	0%
race				
White	51887	55%	888	31%
Black	18175	19%	1239	43%
Hispanic	16400	17%	527	18%
Asian American	5290	6%	173	6%
American Indian	1927	2%	48	2%
Other	990	1%	29	1%
Unknown	0	0%	0	0%
iep				
Yes	8760	9%	240	8%
No	85899	91%	2664	92%
Unknown	10	0%	0	0%
ell				
Yes	6132	6%	154	5%
No	88529	94%	2750	95%
Unknown	8	0%	0	0%
lunch				
Not eligible	52297	55%	1307	45%
Reduced	6012	6%	176	6%
Free	35572	38%	1280	44%
Unknown	788	1%	141	5%
parented				
Did not finish H.S.	7309	8%	208	7%
Graduated H.S.	16601	18%	454	16%
Some ed after H.S.	15678	17%	524	18%
Graduated College	40789	43%	1303	45%
Unknown	14292	15%	415	14%
books				
0-10	13478	14%	351	12%
11-25	20036	21%	616	21%
26-100	31849	34%	983	34%
>100	26343	28%	871	30%
Unknown	2963	3%	83	3%
birthyear				
1989	5	0%	2	0%
1990	202	0%	8	0%
1991	3481	4%	114	4%
1992	34373	36%	881	30%
1993	56304	59%	1863	64%
1994	277	0%	30	1%
1995	22	0%	6	0%
1996	5	0%	0	0%
Unknown	0	0%	0	0%
newspapers				

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	Charter Schools	Public Schools	
yes	37265	39%	1156
no	36973	39%	1107
Unknown	20431	22%	641
magazines			
yes	59607	63%	1827
no	23418	25%	749
Unknown	11644	12%	328
computer			
yes	80508	85%	2441
no	9844	10%	336
Unknown	4317	5%	127
encyclopedia			
yes	67219	71%	2118
no	13906	15%	382
Unknown	13544	14%	404
pagesread			
<5	27862	29%	797
5-10	21598	23%	677
11-15	13621	14%	421
16-20	10432	11%	339
>20	18030	19%	577
Unknown	3126	3%	93
talkstudies			
Never	22141	23%	569
1-2 per month	17520	19%	494
1 per week	15710	17%	496
2-3 times per week	18420	19%	621
Every day	17773	19%	636
Unknown	3105	3%	88
daysabsent			
None	39530	42%	1150
1-2	32235	34%	1026
3-4	12613	13%	394
5-10	5092	5%	181
>10	2212	2%	68
Unknown	2987	3%	85
langinhome			
Never	50755	54%	1379
Once in a while	18667	20%	678
Half the time	7601	8%	261
All or most of the time	13635	14%	472
Unknown	4011	4%	114

Table 16: Descriptive Statistics: Grade 8 Math Scores by State

	Charter Schools						Public Schools					
	n	mean	sd	median	min	max	n	mean	sd	median	min	max
Overall	2904	273.61	36.49	272.60	164.64	392.98	94669	278.91	34.93	279.61	130.77	400.87
Alaska	67	289.78	31.40	288.14	225.56	371.31	2403	284.49	32.69	283.86	158.52	372.61
Arizona	93	279.79	36.70	281.10	203.37	366.48	2438	274.19	35.24	275.41	130.77	369.26
Arkansas	28	268.18	40.47	275.09	194.36	342.43	2343	274.13	33.49	274.63	138.35	375.17
California	343	275.48	38.10	275.74	178.15	362.20	6723	268.14	38.27	267.94	137.96	384.05
Colorado	108	300.18	37.03	305.31	187.52	392.98	2548	284.90	34.35	284.23	166.70	376.59
Delaware	170	291.10	35.23	293.32	215.61	370.08	2449	282.83	31.06	281.99	181.43	375.62
Dist. of Columbia	574	257.99	28.95	257.95	164.64	343.84	1192	244.77	35.61	242.23	136.02	359.58
Florida	168	275.69	31.68	276.22	191.73	360.75	3643	277.62	33.98	279.19	148.70	369.24
Georgia	64	269.01	37.74	269.43	168.67	338.03	3292	270.43	33.06	268.40	156.80	366.03
Hawaii	131	266.39	35.51	265.73	172.29	350.61	2553	268.80	35.53	270.06	142.47	373.36
Idaho	59	299.54	28.69	298.07	228.50	361.19	2712	283.37	32.47	285.21	169.30	367.58
Illinois	33	280.61	31.91	272.39	221.53	343.41	3766	274.13	35.63	274.13	146.32	383.88
Indiana	11	230.84	21.83	235.33	200.38	258.74	2534	285.52	32.24	286.76	159.91	389.26
Kansas	17	293.15	32.61	296.69	244.62	352.36	2595	289.61	30.80	290.10	180.34	381.15
Louisiana	94	279.73	34.87	277.36	207.90	344.93	2184	271.87	28.28	272.13	175.03	366.66
Maryland	6	306.91	45.48	306.57	245.56	367.62	2593	285.43	35.49	284.72	172.15	398.49
Massachusetts	54	294.20	36.32	288.73	214.97	361.74	3265	292.18	35.09	293.83	176.08	400.87
Michigan	127	258.04	35.20	254.17	172.78	335.28	2362	278.09	35.35	279.68	155.70	377.26
Minnesota	16	275.55	28.79	284.30	214.48	313.92	2805	290.94	33.44	291.79	140.05	381.91
Missouri	38	241.11	23.25	241.35	189.33	295.12	2619	280.91	32.10	281.37	164.27	373.04
New Mexico	54	273.58	31.36	282.36	211.75	338.15	2611	266.12	31.73	265.35	156.93	363.23
New York	15	215.92	26.98	214.85	168.81	268.91	3621	277.53	35.45	277.43	164.41	381.25
North Carolina	71	280.14	37.22	288.30	196.93	351.16	3953	282.14	34.80	282.77	164.19	381.06
Ohio	42	251.63	25.81	251.69	192.58	294.96	3375	277.21	33.54	278.04	132.88	385.22
Oregon	41	293.57	32.46	296.49	222.78	357.37	2530	283.04	34.80	283.84	166.08	393.25
Pennsylvania	64	253.40	28.41	254.95	185.30	317.40	2585	287.31	34.11	289.44	145.33	388.20
Rhode Island	30	279.83	34.54	273.16	222.21	362.62	2511	277.75	35.44	279.52	160.67	378.50
South Carolina	16	301.75	25.37	291.12	275.09	357.63	2533	280.78	33.93	279.81	159.32	376.89
Tennessee	53	263.68	23.56	266.62	216.97	328.01	2626	274.01	32.21	273.77	160.51	377.29
Texas	182	289.21	34.76	289.98	208.84	359.39	6226	282.31	33.05	282.55	159.72	382.93
Utah	37	286.05	38.28	281.49	200.76	347.23	2628	281.16	34.13	283.50	153.92	372.46
Wisconsin	98	273.02	34.18	271.08	188.87	352.43	2451	286.57	33.59	288.94	158.39	378.07

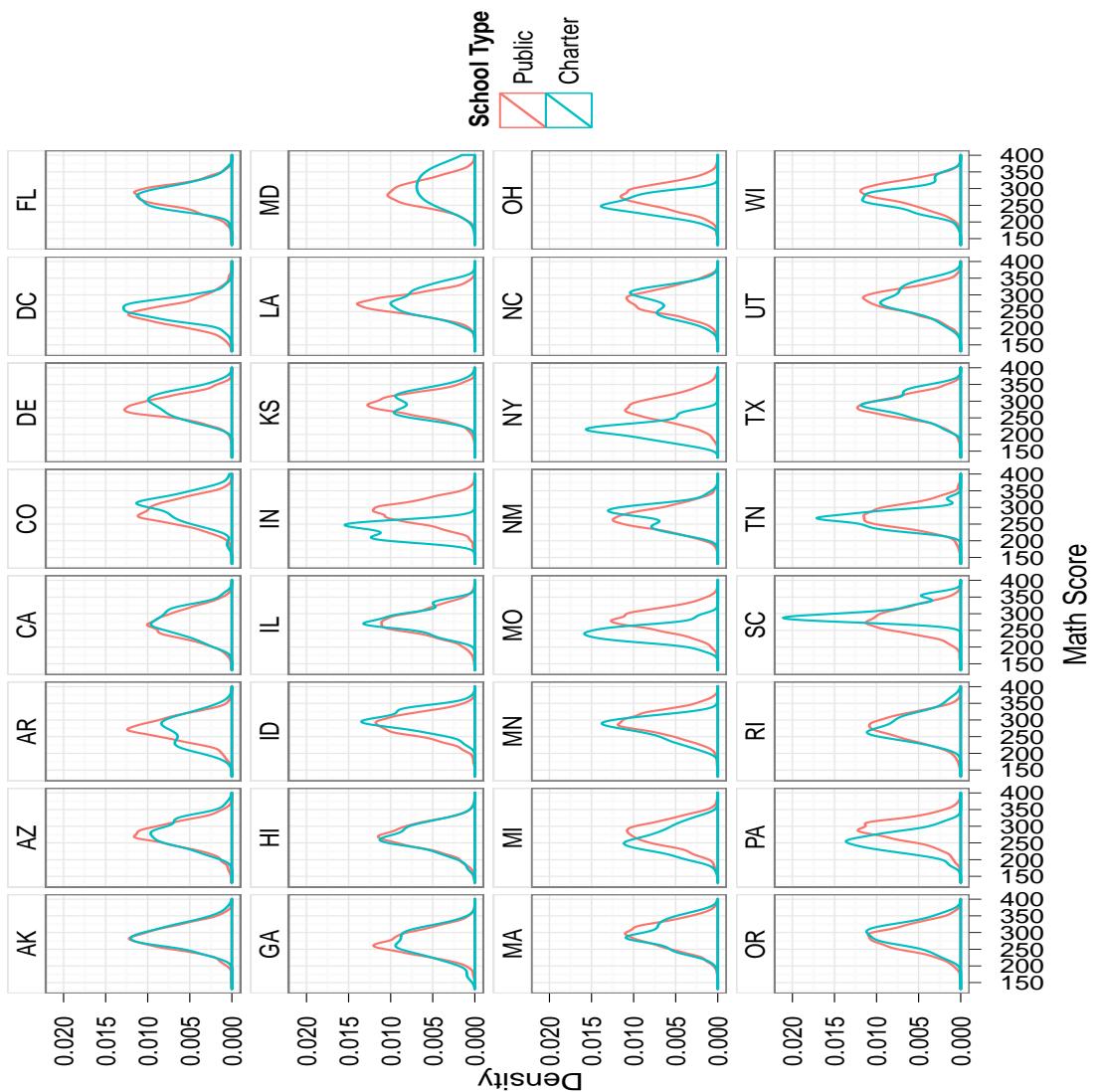


Figure 11: Density Distribution of Grade 8 Math Scores by State

Table 17: Descriptive Statistics: Grade 8 Reading Student Variables

	Public Schools	Charter Schools	
gender			
Male	51406	50%	1425
Female	51016	50%	1636
Unknown	13	0%	0
race			
White	57775	56%	934
Black	19341	19%	1295
Hispanic	16648	16%	556
Asian American	5491	5%	185
American Indian	2021	2%	57
Other	1159	1%	34
Unknown	0	0%	0
iep			
Yes	9690	9%	245
No	92739	91%	2816
Unknown	6	0%	0
ell			
Yes	5730	6%	151
No	96701	94%	2910
Unknown	4	0%	0
lunch			
Not eligible	57536	56%	1393
Reduced	6568	6%	164
Free	37422	37%	1355
Unknown	909	1%	149
parented			
Did not finish H.S.	7437	7%	234
Graduated H.S.	17472	17%	464
Some ed after H.S.	17488	17%	539
Graduated College	44989	44%	1381
Unknown	15049	15%	443
books			
0-10	13695	13%	357
11-25	21225	21%	665
26-100	35510	35%	1017
>100	28853	28%	931
Unknown	3152	3%	91
birthyear			
1989	7	0%	0
1990	248	0%	14
1991	3870	4%	119
1992	37210	36%	918
1993	60832	59%	1981
1994	248	0%	24
1995	13	0%	5
1996	7	0%	0
Unknown	0	0%	0

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	Charter Schools	Public Schools		
newspapers				
yes	40766	40%	1206	39%
no	39865	39%	1235	40%
Unknown	21804	21%	620	20%
magazines				
yes	65639	64%	1938	63%
no	24420	24%	744	24%
Unknown	12376	12%	379	12%
computer				
yes	87385	85%	2555	83%
no	10123	10%	345	11%
Unknown	4927	5%	161	5%
encyclopedia				
yes	72896	71%	2286	75%
no	14520	14%	394	13%
Unknown	15019	15%	381	12%
pagesread				
<5	28725	28%	801	26%
5-10	23757	23%	672	22%
11-15	15709	15%	506	17%
16-20	11774	11%	388	13%
>20	19170	19%	592	19%
Unknown	3300	3%	102	3%
talkstudies				
Never	22614	22%	542	18%
1-2 per month	18399	18%	513	17%
1 per week	17245	17%	526	17%
2-3 times per week	21269	21%	701	23%
Every day	19617	19%	679	22%
Unknown	3291	3%	100	3%
daysabsent				
None	43096	42%	1199	39%
1-2	34878	34%	1062	35%
3-4	13565	13%	441	14%
5-10	5444	5%	182	6%
>10	2265	2%	85	3%
Unknown	3187	3%	92	3%
langinhome				
Never	55596	54%	1444	47%
Once in a while	20392	20%	733	24%
Half the time	8058	8%	279	9%
All or most of the time	14306	14%	498	16%
Unknown	4083	4%	107	3%

Table 18: Descriptive Statistics: Grade 8 Reading Scores by State

	Charter Schools						Public Schools					
	n	mean	sd	median	min	max	n	mean	sd	median	min	max
Overall	3061	259.94	33.11	261.05	106.65	344.51	102435	259.90	32.43	263.02	88.70	366.17
Alaska	73	268.61	27.18	273.91	202.22	326.67	2541	260.54	31.62	264.34	105.68	331.73
Arizona	107	259.81	35.41	259.60	166.05	336.83	2553	253.71	34.68	257.13	96.23	343.55
Arkansas	31	254.60	30.58	254.63	191.98	313.61	2433	258.01	31.37	261.62	116.88	342.40
California	352	251.47	41.24	256.49	106.65	341.42	7255	249.18	36.67	252.64	93.50	354.85
Colorado	106	286.88	25.43	287.58	200.50	332.92	2658	264.99	29.84	268.69	102.19	343.35
Delaware	195	276.59	30.06	278.90	189.58	344.51	2580	264.02	27.96	265.85	140.69	339.78
Dist. of Columbia	559	250.25	27.28	251.62	128.85	326.53	1198	237.71	34.04	236.44	131.49	350.57
Florida	195	269.07	27.07	268.91	193.10	331.39	3795	259.20	32.76	262.44	104.06	350.33
Georgia	63	255.81	28.49	255.44	182.98	317.96	3457	255.69	31.41	257.19	118.33	352.48
Hawaii	141	258.89	27.86	259.61	167.63	317.24	2661	251.59	33.30	253.88	91.26	337.55
Idaho	61	282.57	29.91	289.55	179.57	334.61	2829	264.73	28.43	267.95	141.25	345.19
Illinois	42	260.47	24.61	262.32	202.73	306.11	3963	258.71	32.16	261.57	101.38	347.01
Indiana	13	247.23	22.83	247.06	200.92	275.38	2717	264.12	30.05	266.19	145.33	348.69
Kansas	17	261.84	33.59	269.63	180.63	306.64	2782	267.21	28.41	271.08	141.60	341.87
Louisiana	100	263.83	32.68	262.18	190.30	340.44	2346	252.60	29.54	254.35	130.02	338.94
Maryland	6	289.07	18.63	291.21	262.87	311.20	2663	265.23	30.98	267.21	147.92	347.00
Massachusetts	57	279.09	33.26	286.53	199.74	337.22	3522	268.25	31.66	271.02	109.93	366.17
Michigan	131	256.59	28.38	255.65	140.69	326.29	2475	260.54	32.11	263.79	88.70	342.15
Minnesota	16	266.20	37.18	268.82	200.78	317.26	2977	267.57	30.44	270.88	118.17	347.27
Missouri	48	233.23	29.17	235.20	167.46	285.77	2843	263.84	31.06	266.80	115.18	340.61
New Hampshire	1	252.78	252.78	252.78	252.78	285.77	2858	269.80	27.95	271.68	155.66	364.05
New Mexico	58	255.58	23.02	254.60	203.09	294.83	2587	250.07	30.81	252.56	118.81	328.96
New York	12	212.04	20.85	206.65	185.61	246.94	3764	260.15	33.65	263.85	121.23	348.77
North Carolina	76	259.03	38.58	270.64	110.22	309.98	4138	258.03	34.44	261.66	97.43	351.87
Ohio	45	242.40	32.52	246.43	148.02	303.36	3498	261.96	30.45	263.90	103.67	345.95
Oregon	44	278.78	25.52	280.43	204.57	326.75	2626	264.57	31.79	268.15	104.03	352.59
Pennsylvania	64	256.17	25.13	257.95	191.74	313.40	2750	268.08	30.96	271.89	130.49	349.84
Rhode Island	31	261.71	26.70	259.65	210.82	317.09	2707	260.47	32.93	263.39	129.79	356.05
South Carolina	18	283.05	16.92	282.63	244.64	308.64	2713	256.66	31.17	259.52	101.03	349.08
Tennessee	49	247.55	26.41	245.67	174.00	304.07	2723	259.13	30.97	261.87	91.47	352.89
Texas	201	265.80	28.76	267.85	154.22	332.44	6534	257.87	32.62	260.45	123.79	354.52
Utah	40	274.43	34.59	277.93	190.13	336.07	2742	261.96	31.31	266.20	104.72	343.78
Wisconsin	109	247.64	40.25	253.66	154.59	331.50	2547	265.38	31.66	269.01	134.77	342.42

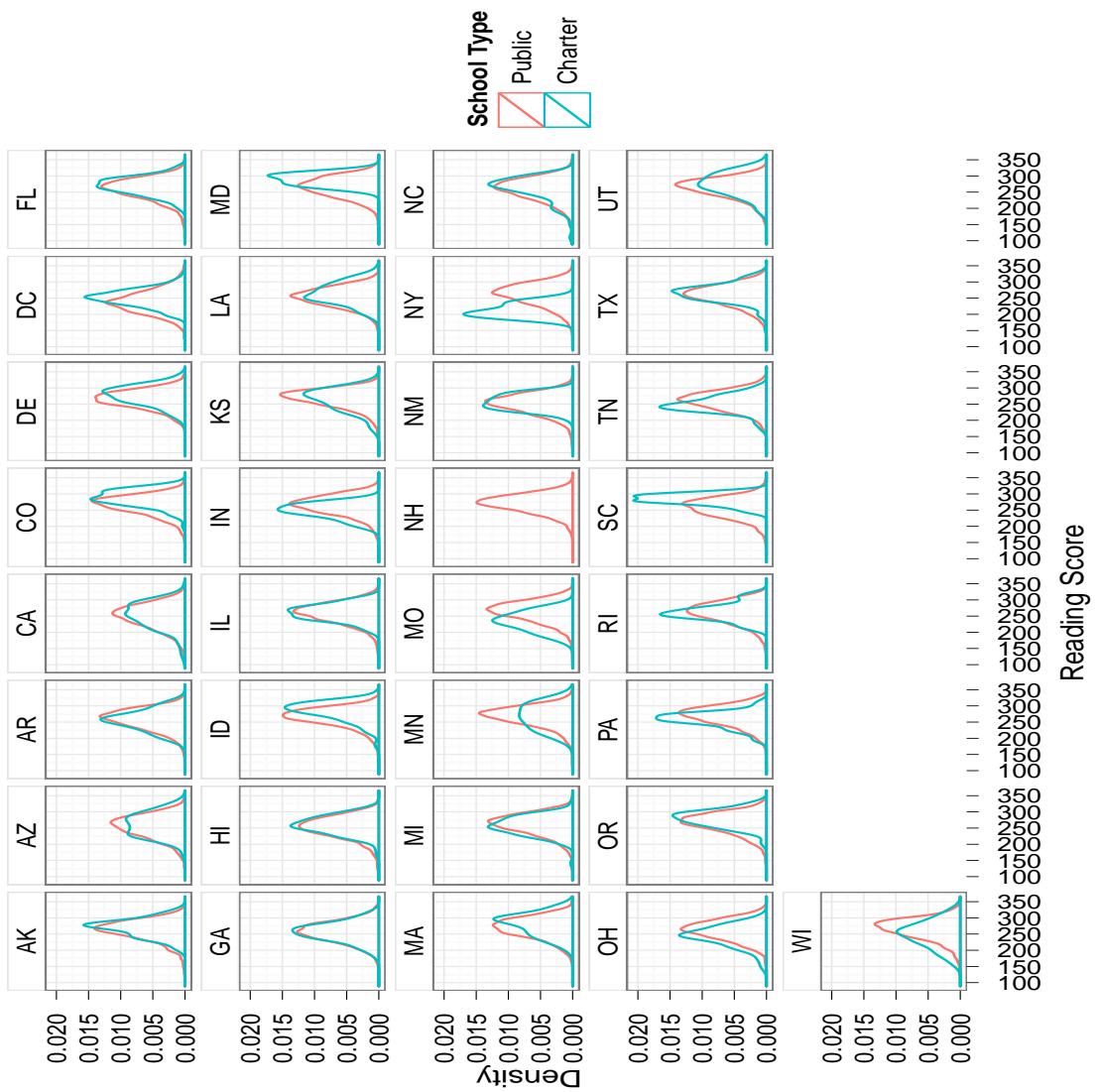


Figure 12: Density Distribution of Grade 8 Reading Scores by State

Appendix E

Covariate Missingness

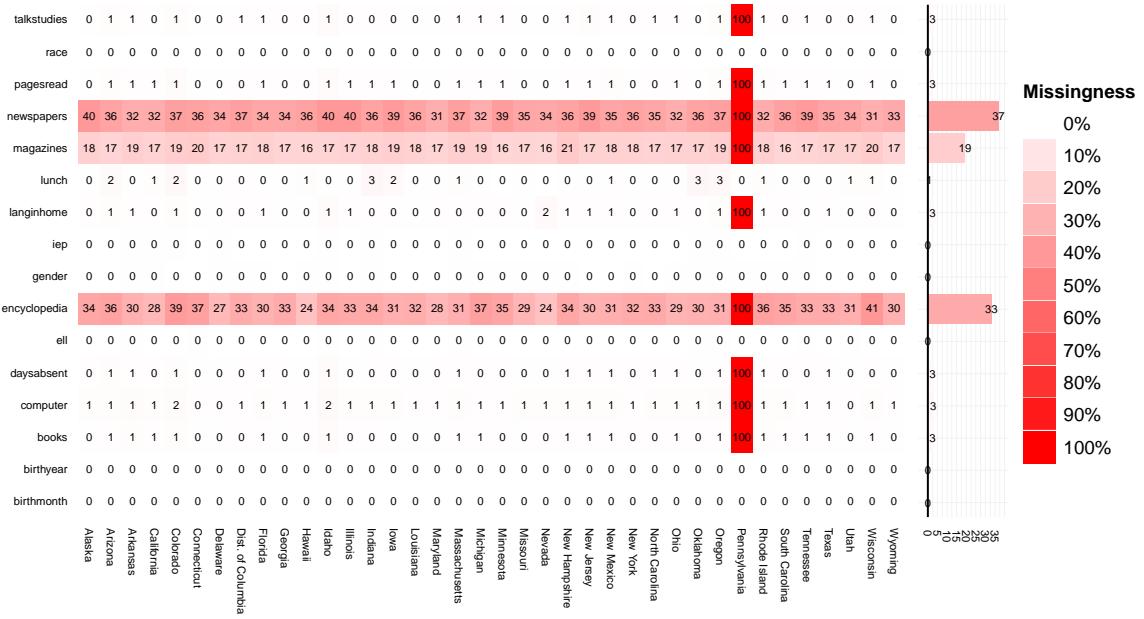


Figure 13: Covariate Missingness for Grade 4 Math

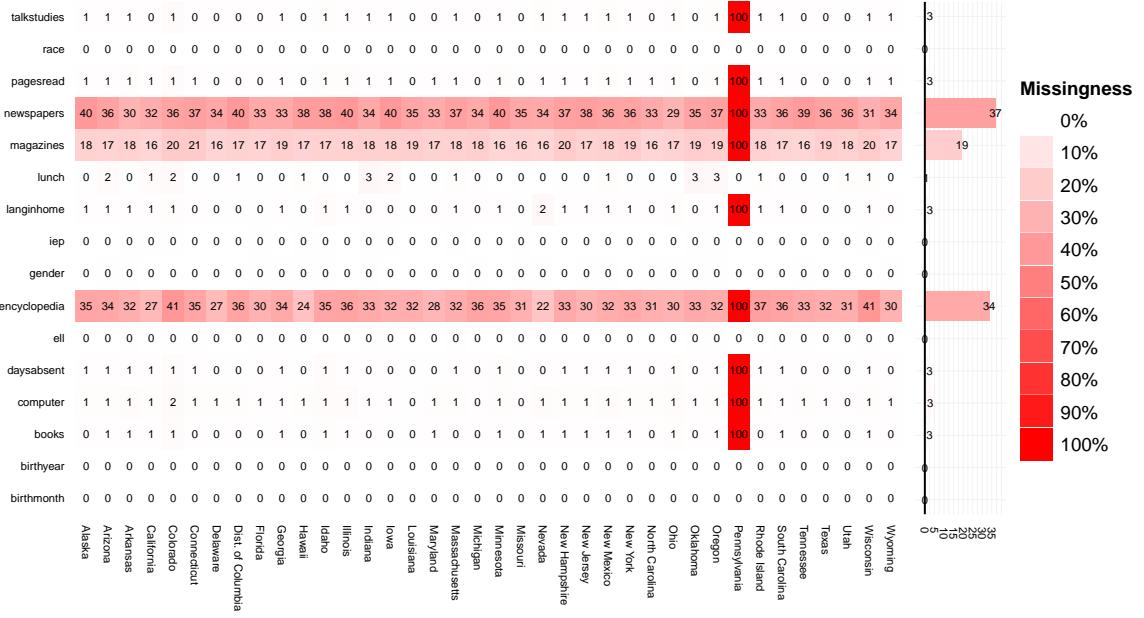


Figure 14: Covariate Missingness for Grade 4 Reading

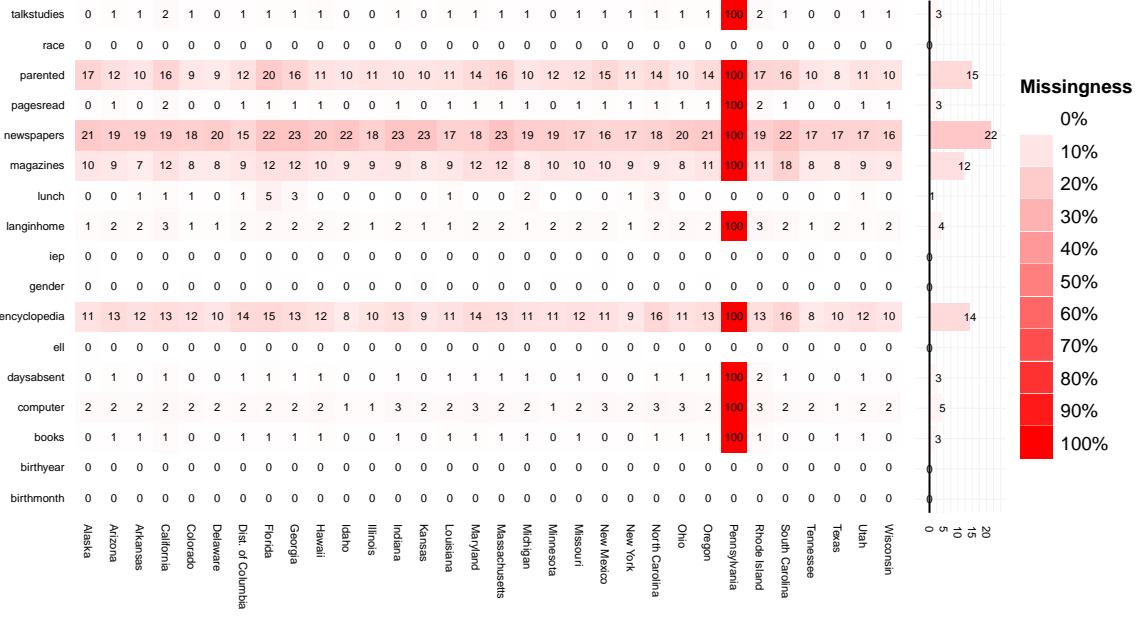


Figure 15: Covariate Missingness for Grade 8 Math

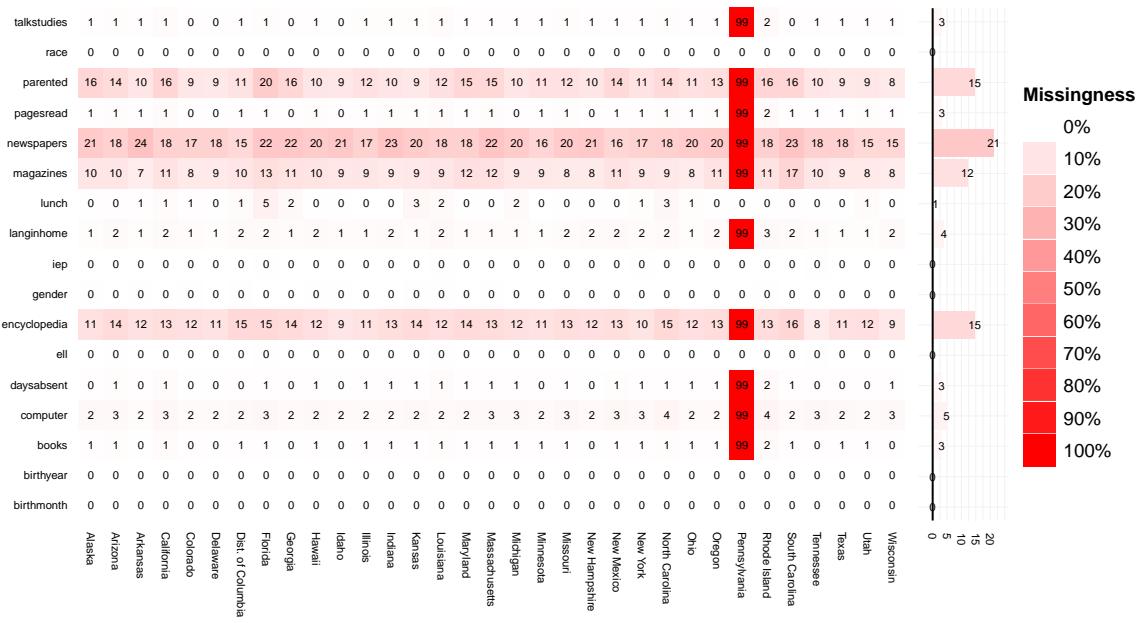


Figure 16: Covariate Missingness for Grade 8 Reading

Appendix F
Logistic Regression Full Model

Table 19: Logistic Regression Level 1 Summary: Grade 4 math

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	7	251.69	12.92	989	230.40	0.91	21.30
Alaska	11	243.73	11.19	567	234.07	1.24	9.66
Alaska	78	249.08	3.07	1096	251.09	0.73	-2.01
Arizona	20	218.25	4.99	794	224.32	1.17	-6.07
Arizona	222	234.86	1.94	2381	235.32	0.60	-0.46
Arkansas	4	241.24	15.43	433	253.39	0.94	-12.15
Arkansas	4	252.13	8.36	193	253.01	1.62	-0.88
Arkansas	12	245.50	5.87	133	249.91	2.13	-4.41
California	10	221.76	9.11	827	222.99	1.22	-1.23
California	165	227.95	2.39	6695	229.10	0.39	-1.15
California	101	225.82	2.69	2080	222.62	0.64	3.20
Colorado	32	240.62	5.31	918	228.89	0.92	11.72
Colorado	144	253.48	1.90	2150	245.43	0.58	8.05
Connecticut	6	245.19	9.24	55	227.68	3.17	17.52
Delaware	40	248.90	2.78	1165	248.66	0.65	0.24
Delaware	145	233.93	1.69	1727	238.87	0.56	-4.93
Dist. of Columbia	376	214.20	1.44	1555	213.74	0.81	0.46
Florida	6	229.13	5.84	695	226.66	0.97	2.47
Florida	45	239.46	3.04	2031	239.53	0.55	-0.07
Florida	165	251.07	1.54	2241	248.32	0.47	2.75
Georgia	19	235.92	7.36	2349	235.12	0.58	0.80
Georgia	27	229.93	4.38	1317	229.37	0.72	0.56
Georgia	35	225.07	3.38	539	225.12	1.08	-0.05
Hawaii	9	233.92	8.54	1254	229.08	0.82	4.84
Hawaii	15	246.91	6.30	929	238.42	0.92	8.49
Hawaii	54	243.32	2.26	757	247.66	0.99	-4.34
Idaho	28	256.70	4.19	1130	243.43	0.70	13.27
Idaho	89	258.91	2.50	1275	249.12	0.64	9.79
Illinois	6	221.80	8.61	604	220.57	1.20	1.22
Illinois	24	219.03	4.76	1133	219.02	0.78	0.01
Illinois	60	226.93	2.27	891	214.41	0.78	12.51
Indiana	7	192.21	8.25	56	220.26	3.24	-28.05
Iowa	4	230.07	9.22	17	240.43	6.29	-10.35
Louisiana	5	247.46	10.87	589	235.04	0.96	12.41
Louisiana	18	235.47	5.20	878	234.11	0.84	1.36
Louisiana	134	236.57	2.27	1382	225.71	0.68	10.85
Maryland	4	215.36	5.68	678	234.03	1.05	-18.67
Maryland	8	215.15	5.48	336	226.60	1.49	-11.45
Maryland	9	212.58	8.93	151	223.72	2.13	-11.15
Massachusetts	7	246.67	11.07	1325	247.03	0.73	-0.37
Massachusetts	10	225.57	7.55	392	235.81	1.29	-10.24
Massachusetts	39	231.15	2.64	392	234.89	1.05	-3.75
Michigan	14	249.97	7.42	520	248.99	1.00	0.98

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Michigan	328	224.79	1.56	2420	237.49	0.57	-12.70
Minnesota	11	253.55	8.34	1882	249.77	0.59	3.78
Minnesota	13	250.22	7.21	482	244.53	1.25	5.69
Minnesota	9	245.57	5.31	152	239.14	2.30	6.43
Missouri	26	199.23	4.90	161	219.72	1.77	-20.48
Nevada	9	224.35	8.06	1709	230.26	0.70	-5.90
Nevada	12	226.30	10.06	457	234.81	1.26	-8.51
Nevada	6	236.05	9.83	117	230.32	2.64	5.72
New Jersey	4	234.57	9.00	348	234.79	1.32	-0.22
New Jersey	7	229.02	9.25	419	236.38	1.18	-7.36
New Jersey	23	222.19	4.18	308	236.33	1.28	-14.15
New York	5	232.09	7.25	266	230.84	1.46	1.25
New York	11	232.49	5.37	142	231.51	1.87	0.98
North Carolina	13	245.21	7.59	1626	240.31	0.64	4.90
North Carolina	14	256.95	6.68	965	255.17	0.77	1.78
North Carolina	49	261.52	2.78	594	253.26	0.86	8.26
Ohio	14	240.94	5.13	1636	250.50	0.58	-9.56
Ohio	27	232.63	4.05	1012	237.13	0.80	-4.50
Ohio	81	217.31	2.33	1011	217.09	0.81	0.22
Oregon	7	228.47	13.59	54	230.51	3.66	-2.05
Pennsylvania	4	228.45	6.72	623	239.89	1.08	-11.43
Pennsylvania	48	245.15	4.33	1681	247.83	0.67	-2.69
Pennsylvania	46	245.44	4.45	840	242.79	0.97	2.65
Rhode Island	9	243.08	9.24	1593	241.33	0.62	1.75
Rhode Island	4	236.79	10.48	280	235.65	1.73	1.14
Rhode Island	15	220.68	5.10	129	217.75	2.98	2.94
Tennessee	4	206.64	8.92	74	219.33	3.04	-12.70
Tennessee	5	215.73	8.19	73	216.15	3.05	-0.43
Texas	19	225.34	5.12	3172	239.87	0.42	-14.53
Texas	37	229.58	3.86	1536	235.41	0.54	-5.83
Texas	70	214.56	2.47	1075	226.00	0.65	-11.44
Utah	12	249.95	7.67	977	239.68	0.81	10.26
Utah	28	254.61	4.43	1618	243.56	0.61	11.05
Utah	36	245.81	4.56	530	244.48	1.09	1.33
Wisconsin	12	256.87	5.12	1952	251.29	0.53	5.58
Wisconsin	6	242.42	11.78	290	235.29	1.69	7.13
Wisconsin	38	206.92	3.54	297	219.07	1.61	-12.16

Table 20: Logistic Regression Level 2 Summary: Grade 4 math

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2748	240.01	248.90	8.89	-2.52 20.29
Arizona	3417	232.70	230.91	-1.79	-7.20 3.61
Arkansas	779	252.65	244.79	-7.86	-20.11 4.39
California	9878	227.15	226.96	-0.20	-6.67 6.27
Colorado	3244	240.59	249.71	9.12	3.49 14.76
Connecticut	61	227.68	245.19	17.52	-2.04 37.07
Delaware	3077	242.70	239.80	-2.91	-6.20 0.39
Dist. of Columbia	1931	213.74	214.20	0.46	-2.78 3.70
Florida	5183	241.87	243.45	1.58	-2.90 6.07
Georgia	4286	231.98	232.59	0.61	-5.48 6.70
Hawaii	3018	236.99	240.51	3.52	-3.65 10.68
Idaho	2522	246.51	257.89	11.39	6.51 16.26
Illinois	2718	217.76	222.41	4.65	-2.03 11.34
Indiana	63	220.26	192.21	-28.05	-45.77 -10.33
Iowa	21	240.43	230.07	-10.35	-33.72 13.01
Louisiana	3006	230.06	238.39	8.33	0.26 16.40
Maryland	1186	230.49	214.93	-15.56	-23.57 -7.55
Massachusetts	2165	242.53	239.66	-2.87	-11.88 6.13
Michigan	3282	239.36	228.88	-10.48	-18.00 -2.96
Minnesota	2549	248.08	252.40	4.32	-3.87 12.51
Missouri	187	219.72	199.23	-20.48	-30.77 -10.20
Nevada	2310	231.19	225.37	-5.81	-16.59 4.97
New Jersey	1109	235.86	228.74	-7.12	-16.11 1.87
New York	424	231.08	232.23	1.15	-8.02 10.32
North Carolina	3261	247.33	251.95	4.63	-2.28 11.54
Ohio	3781	237.18	231.83	-5.34	-9.95 -0.74
Oregon	61	230.51	228.47	-2.05	-30.21 26.11
Pennsylvania	3242	244.92	242.00	-2.92	-8.99 3.15
Rhode Island	2030	238.86	240.61	1.75	-8.24 11.74
Tennessee	156	217.74	211.18	-6.56	-19.26 6.13
Texas	5909	235.99	224.38	-11.61	-16.14 -7.08
Utah	3201	242.53	251.61	9.09	2.51 15.67
Wisconsin	2595	245.31	248.77	3.47	-5.38 12.31

Table 21: Logistic Regression Level 1 Summary: Grade 4 reading

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	6	211.91	17.00	669	204.26	1.34	7.66
Alaska	9	215.07	12.58	581	219.01	1.25	-3.94
Alaska	75	236.33	3.52	1062	232.96	0.83	3.36
Arizona	24	197.42	7.39	691	190.95	1.68	6.47
Arizona	204	207.49	2.20	2467	215.74	0.70	-8.24
Arkansas	10	212.34	7.37	76	236.55	3.05	-24.22
California	11	217.22	12.35	1248	213.28	0.91	3.94
California	141	207.05	3.64	5921	206.24	0.49	0.81
California	113	198.92	3.20	2173	194.42	0.80	4.50
Colorado	29	230.36	4.50	734	216.34	1.10	14.01
Colorado	136	239.45	2.43	1865	233.00	0.69	6.45
Connecticut	8	208.95	13.12	24	198.60	6.64	10.35
Delaware	4	207.83	11.91	153	215.73	2.12	-7.90
Delaware	32	225.70	4.13	1046	232.45	0.75	-6.75
Delaware	144	211.25	2.18	1629	221.79	0.68	-10.54
Dist. of Columbia	362	194.70	1.73	1405	197.49	0.98	-2.79
Florida	9	209.58	10.86	991	208.43	1.00	1.14
Florida	42	223.47	5.38	1787	225.73	0.72	-2.26
Florida	146	235.45	2.17	1841	230.69	0.61	4.76
Georgia	16	230.82	8.80	2273	219.94	0.66	10.88
Georgia	27	203.74	5.18	1203	208.40	0.86	-4.66
Georgia	38	224.64	3.99	627	210.49	1.14	14.14
Hawaii	11	225.15	10.33	1434	206.68	0.87	18.47
Hawaii	23	244.08	5.32	1100	218.20	1.04	25.88
Hawaii	41	236.67	4.52	566	223.94	1.44	12.73
Idaho	8	236.08	10.99	796	213.81	1.09	22.27
Idaho	22	235.49	5.40	1076	225.73	0.86	9.77
Idaho	83	240.83	3.10	1151	236.38	0.76	4.45
Illinois	9	190.18	11.49	1117	208.34	1.09	-18.15
Illinois	20	202.58	5.54	814	201.39	1.16	1.19
Illinois	70	200.47	3.66	938	199.48	1.00	0.98
Indiana	6	177.07	11.35	35	198.62	4.43	-21.55
Louisiana	4	248.42	13.60	492	213.08	1.41	35.34
Louisiana	19	230.81	8.92	996	213.56	1.07	17.25
Louisiana	135	216.61	3.06	1348	201.64	0.90	14.97
Maryland	4	195.92	12.26	198	206.70	2.40	-10.78
Maryland	11	193.14	9.27	113	204.20	2.94	-11.06
Massachusetts	5	200.33	14.67	813	220.62	1.21	-20.29
Massachusetts	13	213.37	9.48	460	206.55	1.46	6.82
Massachusetts	42	210.66	3.97	488	211.53	1.22	-0.88
Michigan	16	221.85	7.89	452	229.02	1.47	-7.17
Michigan	317	205.34	1.98	2480	221.49	0.66	-16.15
Minnesota	5	221.95	12.20	1326	227.59	0.82	-5.65
Minnesota	15	218.25	7.68	594	223.00	1.29	-4.75
Minnesota	14	209.19	11.66	189	211.19	2.47	-2.00
Missouri	24	184.28	7.13	222	204.53	2.03	-20.25
Nevada	11	196.67	17.83	1689	213.78	0.88	-17.11

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Nevada	5	235.20	11.36	344	214.72	1.82	20.48
Nevada	6	205.52	13.08	79	212.85	4.20	-7.33
New Jersey	4	210.22	21.43	510	223.91	1.47	-13.69
New Jersey	8	218.06	8.86	352	217.21	1.58	0.86
New Jersey	24	205.80	5.96	267	212.46	1.76	-6.66
New York	18	205.41	6.95	233	206.24	1.83	-0.83
North Carolina	12	221.78	9.34	1976	213.55	0.72	8.23
North Carolina	30	243.72	5.56	1344	234.89	0.80	8.83
North Carolina	40	240.38	3.97	605	229.58	1.27	10.79
Ohio	12	237.76	9.23	1364	231.20	0.74	6.56
Ohio	27	208.98	6.27	1280	219.92	0.85	-10.93
Ohio	69	205.92	3.32	923	200.65	0.99	5.27
Oregon	7	237.49	4.44	1146	228.47	0.79	9.02
Oregon	5	224.19	13.11	47	222.73	4.35	1.46
Pennsylvania	5	187.37	14.07	629	214.15	1.31	-26.77
Pennsylvania	35	228.54	5.57	1531	229.87	0.87	-1.33
Pennsylvania	66	226.47	3.42	1088	231.98	1.05	-5.51
Rhode Island	11	223.91	9.42	1485	223.74	0.85	0.18
Rhode Island	14	224.80	7.08	109	194.22	3.64	30.58
South Carolina	4	151.84	13.52	31	212.34	5.09	-60.51
Tennessee	8	208.04	6.23	87	196.10	3.68	11.94
Texas	18	206.90	6.99	2857	225.56	0.59	-18.66
Texas	37	201.71	4.68	1922	211.31	0.61	-9.60
Texas	55	193.32	3.96	905	202.74	0.88	-9.43
Utah	7	220.76	10.13	879	221.48	0.98	-0.72
Utah	35	225.00	4.87	1649	230.03	0.72	-5.03
Utah	27	213.96	8.76	446	218.44	1.79	-4.48
Wisconsin	12	227.79	9.99	1691	227.42	0.75	0.36
Wisconsin	43	166.48	5.68	272	197.61	2.25	-31.13
Wyoming	5	239.84	4.23	52	238.69	3.06	1.15

Table 22: Logistic Regression Level 2 Summary: Grade 4 reading

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2402	221.47	224.24	2.77	-11.30 16.85
Arizona	3386	210.50	205.37	-5.14	-12.90 2.63
Arkansas	86	236.55	212.34	-24.22	-40.08 -8.35
California	9607	204.35	206.45	2.10	-6.61 10.81
Colorado	2764	228.40	236.94	8.54	3.36 13.71
Connecticut	32	198.60	208.95	10.35	-19.68 40.38
Delaware	3008	225.29	216.25	-9.04	-17.54 -0.55
Dist. of Columbia	1767	197.49	194.70	-2.79	-6.69 1.11
Florida	4816	224.19	225.53	1.34	-6.75 9.44
Georgia	4184	215.05	221.87	6.83	-0.41 14.06
Hawaii	3175	214.06	234.05	19.99	11.74 28.24
Idaho	3136	226.86	237.74	10.88	2.56 19.20
Illinois	2968	203.38	197.16	-6.22	-14.98 2.54
Indiana	41	198.62	177.07	-21.55	-46.20 3.10
Louisiana	2994	207.58	226.70	19.12	8.22 30.01
Maryland	326	205.75	194.86	-10.89	-26.46 4.69
Massachusetts	1821	214.32	206.72	-7.60	-19.40 4.21
Michigan	3265	222.57	207.71	-14.86	-22.99 -6.73
Minnesota	2143	224.73	219.69	-5.05	-17.31 7.22
Missouri	246	204.53	184.28	-20.25	-34.85 -5.64
Nevada	2134	213.90	203.32	-10.58	-27.11 5.96
New Jersey	1165	218.98	211.54	-7.44	-23.20 8.32
New York	251	206.24	205.41	-0.83	-14.98 13.32
North Carolina	4007	223.45	232.30	8.85	1.21 16.49
Ohio	3675	218.94	218.93	-0.01	-7.68 7.66
Oregon	1205	228.22	236.92	8.69	-5.56 22.95
Pennsylvania	3354	227.62	220.04	-7.58	-17.79 2.64
Rhode Island	1619	221.50	223.98	2.49	-9.64 14.62
South Carolina	35	212.34	151.84	-60.51	-89.89 -31.12
Tennessee	95	196.10	208.04	11.94	-2.43 26.30
Texas	5794	216.96	202.89	-14.07	-20.20 -7.94
Utah	3043	225.74	222.05	-3.69	-13.11 5.74
Wisconsin	2018	222.77	218.22	-4.55	-16.06 6.95
Wyoming	57	238.69	239.84	1.15	-9.31 11.61

Table 23: Logistic Regression Level 1 Summary: Grade 8 math

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	8	282.23	13.07	566	289.08	1.28	-6.86
Alaska	28	296.83	5.08	866	288.67	1.02	8.17
Alaska	31	285.36	6.01	514	291.30	1.39	-5.94
Arizona	4	251.17	11.93	367	258.42	1.94	-7.25
Arizona	5	274.55	13.15	529	274.79	1.47	-0.24
Arizona	19	267.67	8.45	576	278.21	1.28	-10.54
Arizona	65	285.50	4.55	786	285.32	1.15	0.18
Arkansas	7	278.36	13.96	563	280.66	1.44	-2.31
Arkansas	9	260.44	13.27	227	267.74	2.14	-7.30
Arkansas	10	263.32	15.01	126	266.82	2.59	-3.50
California	5	260.31	27.55	440	263.49	1.73	-3.18
California	91	274.37	4.25	2923	267.84	0.71	6.52
California	247	276.20	2.34	3352	269.03	0.66	7.17
Colorado	4	268.11	17.25	365	279.31	1.61	-11.20
Colorado	16	273.96	10.09	534	292.45	1.36	-18.49
Colorado	87	307.28	3.55	971	298.61	1.03	8.67
Delaware	25	271.91	7.73	634	277.43	1.23	-5.51
Delaware	144	294.44	2.81	1707	286.23	0.73	8.21
Dist. of Columbia	572	257.81	1.21	1135	241.65	0.98	16.16
Florida	15	265.68	9.18	681	264.59	1.23	1.09
Florida	36	273.70	4.83	1560	279.52	0.84	-5.82
Florida	117	277.58	2.95	1332	283.70	0.90	-6.12
Georgia	5	250.76	12.52	1188	282.04	0.93	-31.29
Georgia	8	251.32	9.63	889	266.68	1.11	-15.36
Georgia	25	268.60	6.30	820	260.04	1.06	8.56
Georgia	26	278.36	8.87	377	266.51	1.56	11.84
Hawaii	34	264.33	6.08	838	267.44	1.24	-3.11
Hawaii	95	267.73	3.67	1092	272.05	1.05	-4.32
Idaho	9	292.08	9.27	883	285.35	1.01	6.73
Idaho	20	293.78	6.64	586	291.75	1.27	2.03
Idaho	27	308.47	5.26	350	295.02	1.66	13.45
Illinois	9	296.70	11.27	2370	275.28	0.75	21.42
Illinois	6	286.57	13.01	837	271.99	1.20	14.59
Illinois	5	292.64	12.22	308	266.56	1.71	26.08
Illinois	13	262.10	7.01	126	261.99	2.56	0.11
Indiana	10	228.33	6.73	65	259.22	3.60	-30.89
Kansas	7	298.62	13.04	399	294.59	1.40	4.03
Kansas	6	288.01	14.73	71	289.80	3.10	-1.79
Louisiana	10	280.07	9.40	616	277.27	1.08	2.80
Louisiana	15	271.46	10.16	628	274.75	1.17	-3.29
Louisiana	69	281.48	4.19	658	265.98	1.08	15.50
Maryland	5	299.46	20.83	33	300.83	4.84	-1.37
Massachusetts	4	262.25	10.11	990	286.08	1.09	-23.83
Massachusetts	12	298.35	11.54	1159	298.46	0.98	-0.11
Massachusetts	18	301.00	8.97	696	297.72	1.25	3.28
Massachusetts	20	291.97	7.48	259	292.84	2.12	-0.86
Michigan	8	261.74	17.09	576	279.93	1.36	-18.20

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Michigan	30	273.00	6.87	1083	287.00	0.97	-14.00
Michigan	89	252.66	3.38	653	261.93	1.47	-9.26
Minnesota	13	278.28	7.76	84	278.70	4.24	-0.42
Missouri	30	236.28	3.73	240	251.91	1.57	-15.63
New Mexico	8	272.01	14.07	823	272.40	1.05	-0.39
New Mexico	24	278.42	6.07	570	273.49	1.22	4.93
New Mexico	21	267.86	6.76	242	267.02	1.99	0.85
New York	8	210.66	11.05	81	242.12	3.53	-31.46
North Carolina	22	276.52	7.49	1905	283.78	0.77	-7.26
North Carolina	25	291.37	6.72	935	286.40	1.18	4.96
North Carolina	21	272.50	9.56	271	280.81	2.30	-8.31
Ohio	8	261.88	6.93	455	262.69	1.36	-0.81
Ohio	9	267.06	6.37	382	254.88	1.55	12.18
Ohio	25	242.80	5.29	282	250.11	1.69	-7.31
Oregon	6	278.27	14.50	702	290.36	1.20	-12.09
Oregon	16	281.27	7.72	391	295.69	1.73	-14.41
Oregon	18	308.87	6.60	208	289.15	2.30	19.72
Pennsylvania	7	287.97	9.58	1130	294.47	0.89	-6.49
Pennsylvania	5	267.26	13.32	670	291.59	1.22	-24.32
Pennsylvania	49	246.05	3.59	280	261.26	2.12	-15.21
Rhode Island	5	290.25	14.03	333	269.54	2.06	20.71
Rhode Island	5	272.15	8.88	152	253.43	2.87	18.71
Rhode Island	17	269.32	7.39	179	250.72	2.40	18.60
South Carolina	9	310.20	9.47	66	297.73	4.17	12.47
Tennessee	48	262.92	3.42	306	257.16	1.53	5.77
Texas	26	276.56	7.45	2392	284.31	0.70	-7.75
Texas	68	286.28	4.38	2265	284.36	0.64	1.92
Texas	87	295.35	3.41	1046	285.49	0.91	9.86
Utah	8	270.09	4.48	773	290.62	1.03	-20.52
Utah	13	293.26	10.29	412	291.63	1.61	1.63
Utah	14	281.80	12.31	175	277.36	3.00	4.44
Wisconsin	10	290.78	8.70	1132	292.81	0.90	-2.03
Wisconsin	22	286.88	7.49	539	287.14	1.50	-0.26
Wisconsin	66	265.71	4.03	389	263.27	1.75	2.43

Table 24: Logistic Regression Level 2 Summary: Grade 8 math

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2013	289.50	289.56	0.06	-10.00 10.13
Arizona	2351	276.88	273.08	-3.80	-13.80 6.20
Arkansas	942	275.43	271.70	-3.73	-19.88 12.42
California	7058	268.17	274.42	6.24	-12.08 24.57
Colorado	1977	293.29	290.70	-2.60	-15.95 10.76
Delaware	2510	283.92	288.53	4.61	-3.58 12.79
Dist. of Columbia	1707	241.65	257.81	16.16	13.12 19.20
Florida	3741	278.36	273.71	-4.65	-11.79 2.49
Georgia	3338	270.47	258.76	-11.71	-21.19 -2.24
Hawaii	2059	270.10	266.29	-3.81	-10.95 3.33
Idaho	1875	289.36	295.93	6.56	-1.79 14.91
Illinois	3674	273.28	292.72	19.44	8.42 30.47
Indiana	75	259.22	228.33	-30.89	-46.10 -15.69
Kansas	483	293.82	296.92	3.10	-16.52 22.72
Louisiana	1996	272.34	277.81	5.47	-4.07 15.00
Maryland	38	300.83	299.46	-1.37	-44.74 42.00
Massachusetts	3158	293.90	287.02	-6.87	-16.43 2.68
Michigan	2439	277.68	264.12	-13.56	-25.89 -1.24
Minnesota	97	278.70	278.28	-0.42	-17.97 17.13
Missouri	270	251.91	236.28	-15.63	-23.58 -7.67
New Mexico	1688	271.94	273.62	1.68	-9.40 12.75
New York	89	242.12	210.66	-31.46	-54.51 -8.40
North Carolina	3179	284.30	280.63	-3.67	-12.91 5.57
Ohio	1161	256.73	258.58	1.85	-5.43 9.12
Oregon	1341	291.77	284.34	-7.43	-19.19 4.32
Pennsylvania	2141	288.46	275.00	-13.45	-24.56 -2.35
Rhode Island	691	260.54	280.20	19.66	7.44 31.87
South Carolina	75	297.73	310.20	12.47	-8.15 33.09
Tennessee	354	257.16	262.92	5.77	-1.61 13.15
Texas	5884	284.55	284.03	-0.53	-6.66 5.61
Utah	1395	289.13	278.74	-10.39	-21.53 0.75
Wisconsin	2158	285.11	284.48	-0.63	-8.75 7.49

Table 25: Logistic Regression Level 1 Summary: Grade 8 reading

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	8	258.76	11.10	738	260.30	1.16	-1.53
Alaska	29	265.06	4.34	843	264.70	1.02	0.36
Alaska	34	275.81	4.82	524	262.60	1.37	13.20
Arizona	6	228.21	11.03	567	243.42	1.33	-15.21
Arizona	17	238.54	9.40	795	254.43	1.22	-15.89
Arizona	82	267.59	3.53	950	265.91	1.00	1.68
Arkansas	5	276.15	15.75	1503	261.69	0.78	14.46
Arkansas	5	260.25	13.11	515	255.26	1.36	5.00
Arkansas	7	246.50	10.73	217	245.83	2.33	0.67
Arkansas	14	248.94	7.92	144	243.10	2.82	5.84
California	95	246.86	4.37	3228	247.77	0.61	-0.91
California	254	253.00	2.56	3633	250.05	0.64	2.95
Colorado	5	279.06	15.47	501	259.46	1.15	19.59
Colorado	16	279.48	5.89	642	269.84	1.00	9.65
Colorado	83	288.72	2.75	874	278.84	0.84	9.87
Delaware	4	255.44	14.34	203	256.61	1.87	-1.17
Delaware	16	267.79	5.75	627	257.64	1.12	10.15
Delaware	174	277.75	2.31	1683	268.15	0.66	9.60
Dist. of Columbia	558	250.14	1.15	1125	234.51	0.93	15.62
Florida	9	254.26	14.05	618	240.65	1.40	13.60
Florida	42	262.65	3.38	1383	258.18	0.83	4.47
Florida	144	271.86	2.24	1720	268.34	0.70	3.53
Georgia	4	257.03	7.80	956	261.02	1.03	-3.99
Georgia	15	256.64	10.02	1164	256.48	0.95	0.16
Georgia	15	246.95	6.44	710	249.26	1.09	-2.31
Georgia	29	259.81	4.73	402	252.65	1.42	7.16
Hawaii	6	265.72	5.18	310	247.16	1.84	18.56
Hawaii	25	255.19	6.10	1031	250.41	1.06	4.78
Hawaii	110	259.36	2.66	1306	253.83	0.90	5.53
Idaho	11	281.22	4.51	970	265.65	0.79	15.56
Idaho	19	278.84	5.49	825	271.04	0.88	7.80
Idaho	28	291.50	6.19	371	275.61	1.39	15.89
Illinois	6	275.17	15.24	2192	260.96	0.69	14.21
Illinois	11	252.37	7.90	933	254.58	1.06	-2.20
Illinois	11	257.48	7.44	407	251.51	1.46	5.96
Illinois	14	262.89	3.86	188	249.32	2.05	13.57
Indiana	11	243.69	6.88	66	246.23	3.64	-2.55
Kansas	11	270.13	7.80	583	272.02	1.00	-1.89
Louisiana	8	274.18	8.95	630	255.47	1.22	18.70
Louisiana	20	254.76	6.67	673	256.99	1.11	-2.24
Louisiana	72	265.19	4.00	777	250.13	0.98	15.06
Massachusetts	4	274.31	19.71	848	266.87	0.99	7.44
Massachusetts	14	280.60	6.71	1462	270.44	0.77	10.16
Massachusetts	25	277.04	6.76	855	272.34	1.07	4.70
Massachusetts	14	282.61	10.82	216	273.21	2.35	9.40
Michigan	18	262.75	10.06	994	261.63	0.93	1.11
Michigan	20	271.51	5.38	949	271.48	0.90	0.03

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Michigan	93	252.18	2.55	487	238.57	1.53	13.61
Minnesota	14	260.03	9.48	49	256.85	4.69	3.18
Missouri	42	230.35	4.36	270	243.19	1.62	-12.84
New Mexico	13	250.75	5.88	983	249.78	0.98	0.97
New Mexico	21	251.70	4.92	816	257.04	0.95	-5.34
New Mexico	23	260.34	4.93	295	256.57	1.50	3.77
New York	12	212.04	6.02	55	229.16	4.50	-17.12
North Carolina	21	263.29	6.78	1976	257.59	0.73	5.70
North Carolina	34	258.12	7.47	1211	260.62	1.04	-2.50
North Carolina	19	254.46	9.14	271	253.04	2.40	1.42
Ohio	6	243.85	10.62	2272	270.60	0.59	-26.74
Ohio	6	228.90	8.28	513	246.61	1.20	-17.71
Ohio	6	257.02	10.31	338	245.86	1.41	11.16
Ohio	27	241.83	7.11	281	242.85	1.82	-1.03
Oregon	7	285.89	6.81	1452	261.01	0.81	24.88
Oregon	7	274.56	8.11	273	267.66	1.85	6.90
Oregon	27	277.12	5.24	235	263.88	2.24	13.24
Pennsylvania	4	282.73	12.73	1388	271.58	0.79	11.15
Pennsylvania	6	273.72	5.35	789	270.87	1.02	2.85
Pennsylvania	9	260.79	6.23	164	256.96	2.48	3.82
Pennsylvania	45	250.54	3.75	304	249.05	1.85	1.49
Rhode Island	6	250.82	7.18	154	244.12	2.22	6.70
Rhode Island	19	261.40	5.01	178	246.32	2.07	15.07
South Carolina	5	285.67	8.44	172	279.43	1.89	6.24
South Carolina	11	283.16	5.48	132	275.90	2.10	7.26
Tennessee	9	241.53	5.97	199	241.39	2.05	0.14
Tennessee	38	251.34	4.16	360	241.93	1.42	9.41
Texas	24	259.13	5.73	2160	254.46	0.73	4.66
Texas	75	262.62	3.37	2638	263.25	0.58	-0.63
Texas	100	271.01	2.70	1367	261.66	0.77	9.35
Utah	8	268.23	13.08	848	266.79	0.98	1.45
Utah	13	278.88	10.26	459	269.11	1.34	9.77
Utah	16	274.98	9.09	197	263.78	2.44	11.20
Wisconsin	16	283.48	7.77	1427	272.65	0.75	10.83
Wisconsin	16	253.22	8.24	484	261.35	1.34	-8.12
Wisconsin	77	239.03	4.48	385	242.29	1.69	-3.27

Table 26: Logistic Regression Level 2 Summary: Grade 8 reading

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2176	262.65	265.66	3.01	-5.51 11.52
Arizona	2417	256.72	248.49	-8.23	-18.07 1.61
Arkansas	2410	257.61	268.18	10.57	-1.58 22.72
California	7210	249.00	250.17	1.17	-3.87 6.21
Colorado	2121	271.43	283.55	12.12	1.09 23.15
Delaware	2707	264.77	273.67	8.90	-1.42 19.23
Dist. of Columbia	1683	234.51	250.14	15.62	12.72 18.53
Florida	3916	260.21	265.69	5.48	-4.14 15.11
Georgia	3295	255.71	255.03	-0.68	-8.11 6.76
Hawaii	2788	251.78	258.50	6.72	1.01 12.44
Idaho	2224	269.48	282.16	12.68	6.40 18.95
Illinois	3762	257.68	266.82	9.14	-0.32 18.61
Indiana	77	246.23	243.69	-2.55	-18.05 12.96
Kansas	594	272.02	270.13	-1.89	-17.34 13.55
Louisiana	2180	253.88	264.51	10.63	2.78 18.48
Massachusetts	3438	270.22	278.27	8.04	-4.01 20.09
Michigan	2561	260.14	263.67	3.53	-4.22 11.29
Minnesota	63	256.85	260.03	3.18	-17.97 24.33
Missouri	312	243.19	230.35	-12.84	-22.00 -3.68
New Mexico	2151	253.61	252.54	-1.07	-7.18 5.03
New York	67	229.16	212.04	-17.12	-32.14 -2.11
North Carolina	3532	258.29	260.74	2.45	-6.61 11.52
Ohio	3449	262.04	242.74	-19.31	-28.42 -10.20
Oregon	2001	262.32	283.15	20.84	12.86 28.81
Pennsylvania	2709	267.53	274.54	7.00	-0.82 14.83
Rhode Island	357	245.33	256.66	11.32	2.21 20.43
South Carolina	320	277.85	284.55	6.70	-3.58 16.98
Tennessee	606	241.74	247.97	6.23	-1.33 13.78
Texas	6364	259.87	263.35	3.49	-1.27 8.24
Utah	1541	267.08	272.43	5.34	-7.19 17.88
Wisconsin	2405	264.47	268.65	4.18	-3.92 12.28

Appendix G
Logistic Regression Step AIC Model

Table 27: Logistic Regression Step AIC Level 1 Summary: Grade 4 math

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	7	272.74	6.82	906	234.25	0.89	38.49
Alaska	9	215.63	8.08	307	217.35	1.83	-1.72
Alaska	80	250.27	3.00	1311	251.15	0.64	-0.88
Arizona	20	214.02	6.33	638	222.31	1.29	-8.29
Arizona	223	235.33	1.89	2532	235.25	0.59	0.08
Arkansas	4	253.75	12.04	466	250.11	0.98	3.64
Arkansas	6	244.60	10.07	213	251.55	1.62	-6.95
Arkansas	10	243.69	6.15	147	252.48	1.90	-8.79
California	4	227.02	16.18	359	228.60	1.81	-1.58
California	224	227.28	1.99	8466	228.05	0.34	-0.77
California	48	225.40	3.94	777	216.94	1.03	8.45
Colorado	26	239.33	6.17	948	224.26	0.88	15.08
Colorado	150	253.19	1.87	2247	245.87	0.57	7.32
Connecticut	6	238.97	6.96	97	222.65	2.60	16.32
Delaware	36	251.54	2.85	1160	250.66	0.63	0.88
Delaware	147	233.80	1.64	1763	237.81	0.55	-4.01
Dist. of Columbia	376	214.20	1.44	1557	213.76	0.81	0.44
Florida	9	228.77	5.94	709	224.87	0.95	3.90
Florida	38	236.09	3.05	1657	236.34	0.56	-0.25
Florida	169	251.76	1.50	2596	249.75	0.45	2.00
Georgia	27	241.13	4.46	2457	236.60	0.57	4.54
Georgia	22	227.31	5.59	1178	226.90	0.72	0.41
Georgia	32	220.53	3.52	434	221.05	1.20	-0.52
Hawaii	12	238.35	8.01	1541	231.32	0.72	7.03
Hawaii	16	247.12	6.07	539	238.34	1.30	8.78
Hawaii	50	242.00	2.32	892	243.98	0.94	-1.98
Idaho	26	252.70	4.39	1006	242.82	0.75	9.88
Idaho	91	259.04	2.53	1483	248.78	0.59	10.26
Illinois	9	223.68	7.69	567	221.76	1.22	1.92
Illinois	23	226.56	3.84	985	222.21	0.83	4.34
Illinois	58	223.78	2.60	1060	211.21	0.72	12.57
Indiana	7	192.21	8.25	84	217.71	2.48	-25.50
Iowa	4	230.07	9.22	503	229.18	1.12	0.89
Louisiana	8	244.00	9.31	701	234.77	0.89	9.23
Louisiana	9	238.24	8.52	709	232.97	0.96	5.27
Louisiana	140	236.28	2.18	1430	226.68	0.67	9.60
Maryland	11	212.37	8.02	960	234.03	0.94	-21.66
Maryland	8	213.64	2.95	389	223.28	1.30	-9.64
Massachusetts	8	245.06	8.83	976	244.91	0.89	0.16
Massachusetts	8	217.83	6.85	289	235.81	1.53	-17.97
Massachusetts	39	231.15	2.64	440	235.02	0.96	-3.88
Michigan	5	248.24	21.54	146	239.40	1.94	8.84

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Michigan	337	225.49	1.54	2795	239.54	0.53	-14.06
Minnesota	22	246.47	5.02	1983	246.18	0.61	0.29
Minnesota	8	266.15	6.17	307	258.52	1.33	7.63
Missouri	25	198.28	5.00	184	218.69	1.73	-20.41
Nevada	13	221.33	5.70	1689	230.16	0.69	-8.83
Nevada	8	232.84	15.32	382	241.49	1.29	-8.65
Nevada	4	234.37	13.46	46	228.53	4.03	5.84
New Hampshire	5	244.07	5.47	3343	248.51	0.41	-4.43
New Jersey	6	233.94	11.01	364	236.87	1.27	-2.93
New Jersey	4	215.92	7.53	328	235.46	1.34	-19.54
New Jersey	24	224.35	4.02	400	235.30	1.14	-10.95
New York	7	234.88	6.92	617	231.26	0.96	3.61
New York	4	233.02	7.09	304	226.21	1.46	6.81
New York	9	232.20	6.15	183	224.58	1.72	7.62
North Carolina	5	251.62	10.95	2200	230.28	0.52	21.34
North Carolina	9	239.19	8.35	1507	242.31	0.69	-3.11
North Carolina	20	257.05	5.68	988	254.82	0.72	2.23
North Carolina	44	262.53	2.82	559	250.06	0.95	12.47
Ohio	15	242.33	4.97	1794	249.86	0.55	-7.54
Ohio	25	229.49	4.12	790	236.36	0.93	-6.87
Ohio	82	218.10	2.36	1059	217.59	0.79	0.50
Oregon	6	247.15	10.97	1431	237.94	0.66	9.20
Oregon	6	221.30	13.66	50	223.67	4.01	-2.37
Pennsylvania	8	242.20	13.27	574	244.93	1.07	-2.73
Pennsylvania	53	247.42	3.65	1904	247.59	0.61	-0.17
Pennsylvania	37	241.08	5.30	671	237.16	1.20	3.92
Rhode Island	9	233.66	11.11	1487	241.47	0.65	-7.81
Rhode Island	15	220.59	5.09	129	210.02	2.92	10.57
Tennessee	5	214.32	9.31	208	219.68	1.60	-5.36
Texas	7	216.28	7.21	4304	243.17	0.40	-26.89
Texas	18	231.16	5.54	1984	243.33	0.48	-12.17
Texas	31	225.53	4.12	1302	235.24	0.58	-9.71
Texas	73	216.16	2.49	1156	225.47	0.64	-9.30
Utah	57	249.06	3.37	2596	243.25	0.49	5.80
Utah	16	251.55	7.12	298	242.13	1.51	9.43
Wisconsin	11	254.53	5.10	2001	252.46	0.52	2.07
Wisconsin	4	252.19	13.46	352	238.03	1.34	14.16
Wisconsin	39	206.80	3.45	303	218.11	1.65	-11.31
Wyoming	8	274.94	8.34	1188	250.35	0.62	24.59

Table 28: Logistic Regression Step AIC Level 2 Summary: Grade 4 math

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2620	241.19	253.92	12.73	5.41
Arizona	3413	232.76	231.22	-1.54	-8.16
Arkansas	846	250.92	249.52	-1.41	-12.58
California	9878	227.14	227.11	-0.03	-11.07
Colorado	3371	239.62	249.18	9.56	3.16
Connecticut	103	222.65	238.97	16.32	1.58
Delaware	3106	242.76	240.63	-2.13	-5.45
Dist. of Columbia	1933	213.76	214.20	0.44	-2.80
Florida	5178	241.91	243.44	1.53	-3.01
Georgia	4150	232.05	234.82	2.77	-2.53
Hawaii	3050	236.51	241.07	4.56	-2.27
Idaho	2606	246.42	256.53	10.11	5.05
Illinois	2702	217.56	224.79	7.23	1.27
Indiana	91	217.71	192.21	-25.50	-42.61
Iowa	507	229.18	230.07	0.89	-17.36
Louisiana	2997	230.10	238.57	8.47	0.05
Maryland	1368	230.91	212.74	-18.17	-26.70
Massachusetts	1760	240.68	236.68	-4.00	-11.62
Michigan	3283	239.54	226.53	-13.00	-34.27
Minnesota	2320	247.86	249.14	1.29	-6.64
Missouri	209	218.69	198.28	-20.41	-30.85
Nevada	2142	232.18	223.73	-8.45	-22.58
New Hampshire	3348	248.51	244.07	-4.43	-15.18
New Jersey	1126	235.86	225.01	-10.85	-20.07
New York	1124	228.74	233.91	5.17	-2.62
North Carolina	5332	240.58	250.35	9.77	2.31
Ohio	3765	237.16	232.21	-4.95	-9.53
Oregon	1493	237.41	246.18	8.77	-8.87
Pennsylvania	3247	244.84	245.11	0.26	-9.44
Rhode Island	1640	238.71	232.52	-6.20	-18.53
Tennessee	213	219.68	214.32	-5.36	-23.98
Texas	8875	239.56	221.01	-18.56	-23.62
Utah	2967	243.13	249.32	6.19	-1.69
Wisconsin	2710	246.23	248.20	1.97	-7.81
Wyoming	1196	250.35	274.94	24.59	8.18
					41.00

Table 29: Logistic Regression Step AIC Level 1 Summary: Grade 4 reading

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	4	225.08	17.70	609	204.93	1.40	20.15
Alaska	9	221.85	13.88	520	215.05	1.35	6.80
Alaska	76	235.35	3.47	1183	231.94	0.82	3.41
Arizona	25	193.23	6.85	675	184.82	1.74	8.41
Arizona	204	208.11	2.20	2495	216.79	0.68	-8.68
Arkansas	6	219.58	13.62	204	233.78	1.87	-14.20
Arkansas	6	215.94	7.97	48	223.81	3.70	-7.87
California	21	224.54	6.73	1596	214.50	0.81	10.04
California	149	206.93	3.48	5980	205.85	0.49	1.08
California	95	194.89	3.51	1766	190.55	0.86	4.34
Colorado	4	221.29	14.81	449	195.64	1.48	25.65
Colorado	15	224.75	5.48	589	212.27	1.26	12.49
Colorado	149	239.16	2.31	2033	232.90	0.64	6.25
Connecticut	6	204.28	17.20	44	202.21	4.52	2.07
Delaware	4	205.22	12.70	151	220.89	2.15	-15.67
Delaware	34	231.75	3.92	1174	233.18	0.73	-1.43
Delaware	142	209.67	2.11	1504	219.80	0.69	-10.13
Dist. of Columbia	362	194.70	1.73	1407	197.55	0.98	-2.85
Florida	12	204.26	10.76	1104	209.46	0.94	-5.20
Florida	41	226.22	4.64	1718	227.32	0.73	-1.09
Florida	143	235.53	2.26	1744	230.84	0.62	4.69
Georgia	18	226.70	9.01	2340	220.56	0.65	6.14
Georgia	34	208.21	4.31	1242	204.54	0.83	3.68
Georgia	29	226.56	4.60	557	215.20	1.15	11.36
Hawaii	13	224.75	9.14	1442	205.50	0.86	19.24
Hawaii	21	237.10	8.24	1017	218.18	1.06	18.92
Hawaii	41	241.30	3.31	552	229.27	1.44	12.03
Idaho	7	236.56	12.68	873	215.55	1.04	21.01
Idaho	25	234.40	4.73	984	226.89	0.90	7.51
Idaho	81	241.26	3.17	1131	236.04	0.77	5.22
Illinois	11	196.01	9.95	927	203.37	1.15	-7.36
Illinois	19	203.77	6.41	714	201.16	1.20	2.61
Illinois	69	199.54	3.62	963	198.49	0.99	1.04
Indiana	7	182.89	11.22	331	202.40	1.58	-19.51
Iowa	4	236.80	13.47	1439	227.81	0.78	8.99
Louisiana	5	251.02	10.26	576	213.55	1.31	37.46
Louisiana	19	229.80	6.93	927	214.81	1.10	15.00
Louisiana	134	216.42	3.17	1331	200.50	0.90	15.92
Maryland	5	198.23	12.61	619	212.97	1.20	-14.73
Maryland	4	210.23	13.47	215	207.84	2.09	2.40
Maryland	9	191.44	10.22	90	201.26	3.73	-9.82
Massachusetts	9	204.40	13.00	632	215.24	1.35	-10.83
Massachusetts	8	218.04	8.69	471	203.71	1.39	14.33
Massachusetts	43	210.21	4.00	492	212.40	1.19	-2.19
Michigan	6	220.27	11.08	166	219.36	2.57	0.90
Michigan	327	205.87	1.95	2766	222.85	0.62	-16.97

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Minnesota	7	224.38	12.81	1100	226.83	0.89	-2.44
Minnesota	9	216.63	12.10	520	226.43	1.31	-9.81
Minnesota	17	210.37	9.10	423	218.81	1.56	-8.43
Missouri	6	187.23	10.78	149	204.09	2.47	-16.86
Missouri	21	185.33	7.77	265	201.15	1.93	-15.82
Nevada	14	216.23	10.54	2368	210.36	0.75	5.87
Nevada	5	208.05	15.71	126	206.90	2.87	1.15
New Hampshire	4	253.69	7.17	543	226.30	1.27	27.39
New Jersey	5	225.85	11.99	440	231.51	1.47	-5.66
New Jersey	10	212.74	10.71	382	215.67	1.55	-2.93
New Jersey	21	203.23	5.97	365	210.30	1.63	-7.07
New York	19	202.97	6.54	300	205.59	1.64	-2.62
North Carolina	16	224.58	8.99	1691	215.19	0.76	9.39
North Carolina	30	243.93	4.87	1272	235.64	0.82	8.30
North Carolina	35	241.33	4.40	571	232.24	1.30	9.10
Ohio	16	237.31	7.68	1553	233.36	0.68	3.96
Ohio	23	206.61	7.00	1006	217.30	0.93	-10.69
Ohio	69	205.15	3.21	1015	199.77	0.90	5.38
Oregon	8	241.04	4.94	1375	226.28	0.76	14.77
Oregon	6	230.26	12.31	377	226.62	1.34	3.65
Pennsylvania	5	199.89	6.00	595	211.07	1.40	-11.19
Pennsylvania	42	222.62	4.89	1566	228.69	0.83	-6.06
Pennsylvania	59	229.37	3.91	1110	234.59	1.04	-5.22
Rhode Island	10	228.18	8.65	1435	224.74	0.89	3.44
Rhode Island	6	230.49	10.22	231	213.64	2.57	16.85
Rhode Island	9	224.10	8.43	96	179.50	4.26	44.61
Tennessee	6	203.12	7.90	69	193.96	3.85	9.16
Texas	5	189.09	8.85	3391	217.17	0.63	-28.07
Texas	18	205.72	7.88	1498	223.92	0.80	-18.20
Texas	36	199.36	4.86	1976	212.05	0.60	-12.70
Texas	53	195.15	3.93	993	203.96	0.82	-8.81
Utah	48	228.48	4.45	2416	229.62	0.58	-1.14
Utah	18	198.15	9.92	352	203.56	2.17	-5.41
Wisconsin	12	229.06	9.55	1561	228.37	0.77	0.69
Wisconsin	43	166.48	5.68	269	197.65	2.24	-31.17
Wyoming	5	244.20	4.43	689	235.47	1.06	8.72

Table 30: Logistic Regression Step AIC Level 2 Summary: Grade 4 reading

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2401	221.32	229.76	8.43	-6.51 23.37
Arizona	3399	210.20	205.04	-5.16	-12.45 2.12
Arkansas	264	231.74	218.84	-12.91	-28.97 3.16
California	9607	204.34	207.56	3.22	-2.30 8.74
Colorado	3239	223.84	233.97	10.13	-0.39 20.65
Connecticut	50	202.21	204.28	2.07	-33.69 37.83
Delaware	3009	225.23	218.30	-6.92	-15.86 2.01
Dist. of Columbia	1769	197.55	194.70	-2.85	-6.75 1.05
Florida	4762	224.53	224.76	0.24	-7.61 8.08
Georgia	4220	214.97	221.09	6.12	-1.14 13.38
Hawaii	3086	214.34	232.08	17.75	9.32 26.18
Idaho	3101	227.25	237.70	10.45	1.30 19.59
Illinois	2703	200.91	199.46	-1.45	-9.63 6.74
Indiana	338	202.40	182.89	-19.51	-41.81 2.79
Iowa	1443	227.81	236.80	8.99	-17.49 35.46
Louisiana	2992	207.56	227.37	19.81	11.36 28.26
Maryland	942	210.54	200.31	-10.23	-24.33 3.87
Massachusetts	1655	210.98	210.23	-0.76	-11.41 9.90
Michigan	3265	222.66	206.63	-16.03	-27.36 -4.70
Minnesota	2076	225.03	219.44	-5.59	-18.64 7.46
Missouri	441	202.18	186.00	-16.19	-29.60 -2.77
Nevada	2513	210.18	215.80	5.62	-13.16 24.40
New Hampshire	547	226.30	253.69	27.39	13.08 41.69
New Jersey	1223	219.74	214.51	-5.23	-16.58 6.12
New York	319	205.59	202.97	-2.62	-15.89 10.66
North Carolina	3615	225.41	234.36	8.95	1.59 16.30
Ohio	3682	218.98	219.26	0.28	-6.89 7.46
Oregon	1766	226.35	238.70	12.35	-0.74 25.45
Pennsylvania	3377	227.60	220.92	-6.68	-12.49 -0.88
Rhode Island	1787	220.61	228.25	7.64	-3.22 18.50
Tennessee	75	193.96	203.12	9.16	-8.36 26.68
Texas	7970	215.43	195.64	-19.78	-26.39 -13.18
Utah	2834	226.22	224.52	-1.70	-12.58 9.19
Wisconsin	1885	223.29	218.70	-4.59	-15.73 6.56
Wyoming	694	235.47	244.20	8.72	-0.23 17.67

Table 31: Logistic Regression Step AIC Level 1 Summary: Grade 8 math

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	13	293.58	6.77	706	291.86	1.13	1.72
Alaska	35	280.35	5.19	1007	285.43	0.98	-5.09
Alaska	19	304.56	7.33	335	294.29	1.61	10.26
Arizona	6	284.66	13.70	479	277.22	1.45	7.44
Arizona	16	262.38	7.53	507	274.69	1.47	-12.31
Arizona	68	284.81	4.53	910	284.02	1.06	0.79
Arkansas	6	282.76	17.51	1486	274.77	0.87	7.99
Arkansas	6	274.90	7.77	434	283.88	1.42	-8.99
Arkansas	9	241.45	13.43	257	253.78	1.94	-12.33
Arkansas	7	284.31	15.76	87	267.55	3.21	16.75
California	4	271.75	32.36	446	266.36	1.74	5.39
California	89	277.76	4.18	2707	269.86	0.75	7.89
California	250	274.73	2.36	3553	267.06	0.64	7.67
Colorado	4	264.50	18.17	262	277.02	1.94	-12.52
Colorado	14	263.24	8.95	390	289.61	1.62	-26.37
Colorado	89	308.38	3.45	1190	297.27	0.94	11.10
Delaware	22	270.22	7.20	545	272.05	1.35	-1.82
Delaware	148	294.20	2.83	1883	285.96	0.69	8.25
Dist. of Columbia	572	257.81	1.21	1136	241.64	0.98	16.16
Florida	14	273.75	8.83	608	262.95	1.26	10.80
Florida	51	277.84	4.37	1704	281.48	0.81	-3.63
Florida	103	274.88	3.15	1331	279.39	0.94	-4.51
Georgia	6	251.16	10.23	1167	285.04	0.89	-33.88
Georgia	6	255.47	9.66	613	264.03	1.42	-8.56
Georgia	23	263.21	8.36	912	258.99	0.95	4.21
Georgia	29	280.11	7.11	491	268.27	1.36	11.83
Hawaii	5	252.53	20.58	499	265.57	1.59	-13.04
Hawaii	26	271.34	6.52	742	268.22	1.31	3.12
Hawaii	100	265.79	3.57	1175	270.83	1.03	-5.03
Idaho	4	267.74	6.19	779	276.09	1.11	-8.35
Idaho	7	278.60	12.37	602	280.41	1.23	-1.81
Idaho	28	302.96	5.02	797	293.95	1.07	9.01
Idaho	20	308.44	5.80	284	299.36	1.78	9.09
Illinois	11	299.67	9.97	2200	277.10	0.80	22.57
Illinois	6	272.09	7.44	864	264.78	1.02	7.31
Illinois	12	270.91	8.93	363	270.46	1.45	0.44
Illinois	4	270.14	17.04	42	270.24	4.79	-0.10
Indiana	8	228.30	7.55	117	264.27	2.94	-35.97
Kansas	6	297.49	12.95	1612	292.30	0.75	5.20
Kansas	9	290.51	12.15	235	287.48	1.83	3.03
Louisiana	10	272.31	11.86	591	277.56	1.15	-5.24
Louisiana	23	282.01	9.27	583	279.06	1.22	2.94
Louisiana	60	279.36	3.92	709	262.94	0.96	16.42
Maryland	6	306.91	18.57	1499	293.60	0.93	13.31
Massachusetts	21	302.01	8.77	1318	297.53	0.92	4.48
Massachusetts	31	292.09	5.80	1000	300.74	0.99	-8.65

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Michigan	8	256.04	15.41	579	277.80	1.27	-21.76
Michigan	44	280.23	5.29	1286	289.24	0.89	-9.01
Michigan	75	245.24	3.17	489	248.84	1.47	-3.61
Minnesota	4	270.14	15.67	282	262.93	1.95	7.21
Minnesota	12	277.36	8.41	130	283.31	3.25	-5.96
Missouri	31	236.70	3.76	292	253.86	1.45	-17.16
New Mexico	12	276.33	9.12	750	273.98	1.14	2.35
New Mexico	18	280.85	7.16	588	272.58	1.20	8.28
New Mexico	21	264.86	5.89	248	268.15	1.72	-3.29
New York	5	235.89	12.89	363	262.90	1.58	-27.01
New York	8	201.46	7.33	61	228.25	3.13	-26.78
North Carolina	40	286.02	5.53	2410	284.22	0.70	1.80
North Carolina	12	289.49	9.02	709	287.69	1.26	1.80
North Carolina	17	262.66	10.18	226	274.31	2.51	-11.64
Ohio	7	266.86	6.12	386	261.65	1.56	5.21
Ohio	9	257.63	6.83	474	256.77	1.33	0.85
Ohio	24	242.72	5.52	261	250.92	1.81	-8.20
Oregon	11	271.46	11.28	798	292.95	1.17	-21.49
Oregon	12	288.37	7.10	463	287.77	1.62	0.60
Oregon	15	314.08	6.54	170	285.46	2.54	28.62
Pennsylvania	9	283.75	7.93	1289	293.75	0.82	-10.00
Pennsylvania	5	265.53	13.37	511	292.47	1.43	-26.94
Pennsylvania	47	246.03	3.60	297	261.59	2.01	-15.56
Rhode Island	6	306.57	17.82	1645	283.81	0.81	22.76
Rhode Island	5	256.36	14.02	160	250.51	2.58	5.85
Rhode Island	18	278.52	6.69	250	251.52	2.01	27.00
South Carolina	4	293.09	10.63	563	292.37	1.32	0.72
South Carolina	10	303.08	9.09	646	296.53	1.28	6.55
Tennessee	5	273.25	7.53	138	251.08	2.23	22.17
Tennessee	47	262.23	3.52	349	256.07	1.49	6.16
Texas	25	286.68	7.75	2245	287.27	0.70	-0.59
Texas	79	284.97	4.04	2222	283.28	0.65	1.70
Texas	76	295.03	3.67	993	282.23	0.98	12.81
Utah	18	285.02	7.04	1116	288.67	0.90	-3.65
Utah	11	284.72	15.06	356	287.47	1.97	-2.76
Utah	5	279.49	22.11	99	253.29	4.03	26.20
Wisconsin	14	291.14	7.63	994	292.42	0.96	-1.28
Wisconsin	14	283.54	8.86	447	286.27	1.69	-2.73
Wisconsin	69	266.90	4.11	405	262.83	1.71	4.07

Table 32: Logistic Regression Step AIC Level 2 Summary: Grade 8 math

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2115	289.10	288.90	-0.20	-7.70
Arizona	1986	279.90	278.87	-1.03	-11.78
Arkansas	2292	273.79	276.52	2.74	-11.24
California	7049	268.13	275.74	7.62	-13.80
Colorado	1949	292.92	293.03	0.11	-13.44
Delaware	2598	282.92	288.97	6.05	-1.68
Dist. of Columbia	1708	241.64	257.81	16.16	13.12
Florida	3811	277.67	276.06	-1.61	-8.46
Georgia	3247	270.85	260.09	-10.76	-19.59
Hawaii	2547	269.00	264.84	-4.16	-18.54
Idaho	2521	285.78	286.80	1.01	-6.85
Illinois	3502	273.24	289.35	16.11	4.60
Indiana	125	264.27	228.30	-35.97	-52.00
Kansas	1862	291.67	296.58	4.91	-12.60
Louisiana	1976	272.33	278.03	5.70	-4.55
Maryland	1505	293.60	306.91	13.31	-23.16
Massachusetts	2370	298.93	297.70	-1.23	-11.63
Michigan	2481	277.35	266.55	-10.80	-21.73
Minnesota	428	269.70	272.53	2.84	-15.03
Missouri	323	253.86	236.70	-17.16	-25.09
New Mexico	1637	272.50	276.12	3.62	-5.03
New York	437	257.43	230.45	-26.97	-41.94
North Carolina	3414	284.25	285.09	0.84	-8.94
Ohio	1161	256.99	257.09	0.11	-7.12
Oregon	1469	290.33	282.30	-8.04	-17.97
Pennsylvania	2158	288.32	273.38	-14.94	-25.51
Rhode Island	2084	277.02	298.99	21.97	6.36
South Carolina	1223	294.60	298.45	3.85	-9.99
Tennessee	539	254.74	265.15	10.41	1.83
Texas	5640	284.68	287.57	2.88	-3.38
Utah	1605	286.10	284.60	-1.51	-19.84
Wisconsin	1943	283.74	283.42	-0.32	-8.60

Table 33: Logistic Regression Step AIC Level 1 Summary: Grade 8 reading

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	8	246.91	6.68	535	254.42	1.44	-7.51
Alaska	32	268.76	4.51	1164	265.97	0.84	2.79
Alaska	31	277.10	4.60	589	266.56	1.14	10.54
Arizona	4	215.71	5.98	215	222.93	2.21	-7.22
Arizona	4	239.78	13.11	463	242.22	1.52	-2.44
Arizona	19	254.86	8.44	816	253.83	1.16	1.03
Arizona	80	264.19	3.87	1057	264.90	0.97	-0.71
Arkansas	5	273.67	14.42	1520	262.51	0.76	11.16
Arkansas	7	258.17	14.95	447	251.18	1.53	6.98
Arkansas	6	251.25	6.04	227	247.90	2.17	3.34
Arkansas	13	246.89	8.27	142	242.58	2.79	4.31
California	105	248.87	4.21	3141	247.83	0.63	1.04
California	244	252.45	2.60	3704	249.97	0.62	2.49
Colorado	8	277.66	9.53	461	260.60	1.26	17.06
Colorado	19	276.68	5.78	681	267.21	0.94	9.47
Colorado	78	289.89	2.79	905	279.86	0.80	10.03
Delaware	5	275.19	7.26	151	254.72	2.14	20.48
Delaware	18	259.84	5.56	595	258.81	1.12	1.03
Delaware	172	278.39	2.33	1761	267.35	0.66	11.04
Dist. of Columbia	558	250.14	1.15	1125	234.51	0.93	15.62
Florida	7	259.86	9.87	539	241.98	1.47	17.88
Florida	46	264.20	3.81	1424	259.79	0.83	4.40
Florida	140	271.63	2.27	1692	267.36	0.70	4.27
Georgia	6	256.96	5.62	1108	261.67	0.92	-4.71
Georgia	11	265.27	11.52	966	257.68	1.08	7.59
Georgia	27	247.83	5.16	795	246.01	0.99	1.82
Georgia	19	261.33	6.12	365	253.35	1.48	7.98
Hawaii	37	257.04	5.00	1104	247.73	1.02	9.31
Hawaii	102	259.33	2.69	1418	254.82	0.87	4.50
Idaho	19	264.89	7.71	1311	263.29	0.71	1.60
Idaho	15	284.67	6.19	708	267.74	0.97	16.94
Idaho	26	296.86	3.82	517	279.84	1.01	17.02
Illinois	7	266.84	15.55	2438	261.94	0.63	4.90
Illinois	11	263.43	7.80	716	250.38	1.22	13.05
Illinois	14	252.76	4.91	465	251.51	1.41	1.25
Illinois	10	263.55	5.05	138	241.40	2.76	22.15
Indiana	10	248.29	6.11	87	242.60	3.29	5.69
Kansas	4	261.91	14.13	1273	272.73	0.72	-10.82
Kansas	13	261.82	10.02	1261	268.68	0.71	-6.85
Louisiana	5	264.48	6.05	592	258.38	1.25	6.11
Louisiana	18	263.81	8.33	670	255.55	1.15	8.26
Louisiana	74	262.96	3.82	809	248.79	0.95	14.17
Massachusetts	5	279.85	10.65	803	263.64	0.99	16.21
Massachusetts	26	269.38	6.70	1697	271.51	0.72	-2.13
Massachusetts	26	288.66	6.28	892	273.41	1.08	15.25
Michigan	38	268.91	5.44	1936	267.18	0.65	1.74

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Michigan	4	250.18	12.44	121	250.46	3.24	-0.28
Michigan	89	251.61	2.60	418	232.70	1.51	18.91
Minnesota	13	263.59	9.49	68	255.90	4.06	7.69
Missouri	4	221.11	18.29	84	237.05	4.65	-15.93
Missouri	41	233.02	4.35	323	241.86	1.45	-8.83
New Mexico	13	253.28	7.10	1029	251.73	0.93	1.55
New Mexico	28	255.37	4.15	910	255.69	0.93	-0.32
New Mexico	14	262.36	6.29	151	257.86	2.28	4.50
New York	11	208.86	5.60	66	222.77	4.30	-13.91
North Carolina	33	260.41	5.73	2314	254.10	0.69	6.31
North Carolina	31	277.15	3.54	1085	271.39	0.98	5.76
North Carolina	10	198.81	14.26	124	233.51	3.49	-34.70
Ohio	5	247.55	8.40	1812	268.04	0.68	-20.50
Ohio	7	234.65	7.87	394	248.76	1.36	-14.11
Ohio	8	245.23	11.02	376	244.67	1.40	0.57
Ohio	25	242.63	7.65	301	244.57	1.72	-1.94
Oregon	8	285.05	9.58	1522	262.27	0.79	22.78
Oregon	6	286.27	6.85	587	273.66	1.28	12.61
Oregon	4	242.34	15.24	221	257.34	2.41	-15.01
Oregon	26	280.73	4.40	263	266.34	1.88	14.39
Pennsylvania	9	277.29	5.56	1865	271.73	0.67	5.56
Pennsylvania	8	261.47	8.12	383	268.25	1.63	-6.78
Pennsylvania	47	251.22	3.63	330	247.88	1.75	3.34
Rhode Island	5	284.81	17.18	2009	267.91	0.66	16.90
Rhode Island	7	254.70	10.53	136	237.33	2.49	17.37
Rhode Island	18	258.65	4.95	214	247.33	1.94	11.32
South Carolina	6	276.69	9.25	177	274.48	1.90	2.22
South Carolina	7	288.33	5.85	115	275.26	2.36	13.07
Tennessee	10	237.39	9.82	204	236.36	2.17	1.03
Tennessee	39	250.16	3.98	437	241.25	1.32	8.91
Texas	4	224.94	15.43	634	233.55	1.49	-8.61
Texas	22	255.95	6.98	1963	256.44	0.76	-0.49
Texas	84	264.88	2.96	2569	263.19	0.58	1.69
Texas	91	270.82	2.88	1353	261.11	0.78	9.71
Utah	5	272.71	7.41	852	264.31	1.00	8.40
Utah	10	272.20	12.88	747	265.50	1.09	6.70
Utah	10	260.67	14.64	433	267.25	1.40	-6.59
Utah	15	285.66	5.97	208	268.39	1.87	17.28
Wisconsin	23	277.29	6.28	1734	273.30	0.66	3.99
Wisconsin	12	246.02	9.42	437	255.87	1.50	-9.85
Wisconsin	74	238.68	4.66	328	239.22	1.81	-0.54

Table 34: Logistic Regression Step AIC Level 2 Summary: Grade 8 reading

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2359	263.46	265.92	2.46	-3.75 8.66
Arizona	2658	253.98	252.97	-1.00	-9.54 7.53
Arkansas	2367	257.60	266.73	9.14	-2.38 20.65
California	7194	249.00	250.84	1.83	-3.10 6.76
Colorado	2152	271.55	282.93	11.38	3.78 18.98
Delaware	2702	264.68	274.00	9.31	2.93 15.69
Dist. of Columbia	1683	234.51	250.14	15.62	12.72 18.53
Florida	3848	260.87	267.12	6.25	-0.92 13.42
Georgia	3297	255.62	257.65	2.04	-5.45 9.53
Hawaii	2661	251.78	258.35	6.57	0.85 12.28
Idaho	2596	267.99	277.09	9.10	2.09 16.10
Illinois	3799	257.61	264.29	6.67	-2.68 16.02
Indiana	97	242.60	248.29	5.69	-8.09 19.47
Kansas	2551	270.71	261.87	-8.84	-25.85 8.18
Louisiana	2168	253.58	263.65	10.07	2.78 17.36
Massachusetts	3449	270.17	276.96	6.79	-2.46 16.05
Michigan	2606	259.67	264.65	4.98	-4.36 14.33
Minnesota	81	255.90	263.59	7.69	-12.85 28.24
Missouri	452	240.92	230.71	-10.22	-29.30 8.87
New Mexico	2145	253.93	254.89	0.96	-6.02 7.95
New York	77	222.77	208.86	-13.91	-27.98 0.17
North Carolina	3597	258.70	263.31	4.61	-5.97 15.20
Ohio	2928	259.72	244.93	-14.79	-23.56 -6.03
Oregon	2637	264.86	281.21	16.35	6.52 26.18
Pennsylvania	2642	267.81	271.23	3.42	-3.63 10.46
Rhode Island	2389	264.08	280.47	16.39	2.67 30.11
South Carolina	305	274.79	281.35	6.56	-4.61 17.73
Tennessee	690	239.74	246.20	6.46	-4.24 17.16
Texas	6720	257.94	259.73	1.79	-6.80 10.39
Utah	2280	265.67	271.47	5.79	-4.93 16.52
Wisconsin	2608	265.05	265.95	0.91	-7.25 9.06

Appendix H

Conditional Inference Trees

Table 35: Conditional Inference Trees Level 1 Summary: Grade 4 math

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	86	250.01	3.03	1626	247.48	0.64	2.53
Alaska	10	237.02	10.14	1235	227.30	0.82	9.72
Arizona	6	218.57	13.00	80	227.58	2.65	-9.01
Arizona	23	215.36	5.85	71	210.36	3.55	5.01
Arizona	17	218.38	5.64	542	201.51	1.22	16.87
Arizona	81	240.26	2.67	1734	245.96	0.61	-5.70
Arizona	34	230.44	3.57	477	222.57	1.11	7.86
Arizona	83	237.27	3.66	390	227.53	1.43	9.74
Arkansas	20	245.97	4.73	1320	249.09	0.66	-3.11
California	48	225.40	3.94	784	216.80	1.03	8.60
California	228	227.27	1.97	8818	228.09	0.34	-0.82
Colorado	132	254.86	1.97	1874	249.88	0.56	4.98
Colorado	44	239.98	4.12	1321	224.66	0.76	15.31
Connecticut	7	240.00	5.97	410	220.50	1.36	19.50
Delaware	72	229.20	2.35	451	224.68	0.93	4.52
Delaware	43	232.84	2.65	525	234.12	0.89	-1.29
Delaware	71	247.98	2.21	2135	247.90	0.48	0.08
Dist. of Columbia	52	208.22	3.32	315	203.32	1.46	4.89
Dist. of Columbia	289	213.18	1.63	1001	209.69	0.88	3.49
Dist. of Columbia	23	219.81	5.10	108	221.19	2.91	-1.38
Dist. of Columbia	12	253.90	7.32	136	262.38	2.64	-8.48
Florida	95	251.49	1.99	2182	250.76	0.50	0.72
Florida	37	234.85	3.33	1704	232.95	0.57	1.90
Florida	50	254.10	2.92	330	246.74	1.22	7.36
Florida	34	243.86	2.97	755	232.90	0.88	10.96
Georgia	4	201.29	13.80	1726	248.47	0.57	-47.18
Georgia	19	220.46	4.22	1514	217.71	0.57	2.75
Georgia	45	236.51	3.80	1115	227.02	0.71	9.48
Georgia	13	225.52	4.28	312	219.23	1.57	6.29
Hawaii	34	243.13	2.96	646	241.32	1.14	1.80
Hawaii	34	238.82	3.64	1503	233.45	0.78	5.38
Hawaii	11	250.91	6.90	1215	231.59	0.86	19.32
Idaho	37	250.86	4.00	1148	244.23	0.65	6.63
Idaho	18	256.43	5.54	1093	229.15	0.76	27.28
Idaho	65	261.69	2.88	1223	247.25	0.74	14.44
Illinois	66	224.22	2.38	1260	213.45	0.68	10.77
Illinois	24	225.18	4.21	1379	221.58	0.73	3.60
Indiana	8	192.00	7.15	312	225.45	1.32	-33.46
Iowa	4	230.07	9.22	800	229.43	0.88	0.64
Louisiana	11	251.04	5.51	1074	237.85	0.68	13.19
Louisiana	18	266.08	4.46	235	245.70	1.58	20.38
Louisiana	113	233.59	2.23	1131	222.22	0.69	11.36

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Louisiana	14	214.55	5.12	334	215.82	1.25	-1.27
Maryland	20	214.17	4.55	1549	225.18	0.66	-11.01
Massachusetts	7	255.32	8.73	2694	256.54	0.41	-1.21
Massachusetts	29	231.36	3.44	455	229.23	1.09	2.12
Massachusetts	22	225.75	3.93	935	227.02	0.77	-1.27
Michigan	22	225.09	5.30	117	232.16	2.61	-7.06
Michigan	121	243.66	2.39	2432	244.43	0.50	-0.77
Michigan	199	215.05	1.77	446	213.99	1.30	1.06
Minnesota	33	250.06	4.14	3538	246.26	0.45	3.80
Missouri	20	208.03	5.80	509	220.73	1.06	-12.70
Missouri	9	188.63	7.25	57	205.23	3.15	-16.60
Nevada	28	226.90	5.41	4005	231.03	0.45	-4.13
New Hampshire	5	244.07	5.47	3343	248.51	0.41	-4.43
New Jersey	34	225.05	3.54	1207	233.52	0.71	-8.47
New York	4	230.29	8.50	3558	244.87	0.44	-14.58
New York	16	234.05	4.31	1010	226.34	0.77	7.72
North Carolina	14	259.92	5.33	483	238.70	1.09	21.21
North Carolina	17	269.47	4.27	215	249.16	1.68	20.31
North Carolina	19	264.48	5.04	1940	255.46	0.51	9.02
North Carolina	23	245.36	4.53	780	239.46	0.81	5.91
North Carolina	5	243.04	9.97	2062	225.80	0.51	17.24
Ohio	20	234.63	4.29	794	245.69	0.90	-11.06
Ohio	11	231.65	6.32	468	236.60	1.13	-4.95
Ohio	8	248.37	5.69	1422	249.51	0.64	-1.14
Ohio	74	217.06	2.48	1026	216.44	0.77	0.62
Ohio	9	218.41	6.49	10	217.83	10.02	0.58
Oklahoma	4	202.33	8.85	334	220.65	1.23	-18.31
Oregon	6	221.30	13.66	134	221.52	2.53	-0.22
Oregon	8	252.33	8.84	3352	236.10	0.47	16.23
Pennsylvania	74	252.31	2.51	2923	247.52	0.46	4.79
Pennsylvania	5	206.36	19.34	16	206.29	9.61	0.07
Pennsylvania	19	224.64	8.39	442	224.19	1.61	0.46
Rhode Island	12	217.17	5.28	216	204.35	2.15	12.82
Rhode Island	15	234.39	6.23	2768	237.53	0.49	-3.13
South Carolina	7	233.80	9.09	3560	237.56	0.47	-3.76
Tennessee	9	211.69	5.87	831	213.92	0.84	-2.24
Texas	6	231.56	10.44	2715	255.53	0.41	-23.98
Texas	5	214.72	3.48	2162	228.11	0.47	-13.38
Texas	36	227.32	3.89	2338	239.32	0.43	-12.00
Texas	82	217.07	2.40	1531	228.50	0.58	-11.43
Utah	76	249.71	2.96	3178	242.01	0.45	7.70
Wisconsin	17	253.49	5.52	2808	248.30	0.46	5.18
Wisconsin	39	206.80	3.45	236	210.97	1.71	-4.17
Wyoming	8	274.94	8.34	2709	243.88	0.45	31.06

Table 36: Conditional Inference Trees Level 2 Summary: Grade 4 math

State	n	Public	Charter	Diff	Confidence	Interval
Alaska	2957	238.98	244.54	5.56	-4.86	15.98
Arizona	3538	231.71	233.80	2.09	-3.50	7.68
Arkansas	1340	249.09	245.97	-3.11	-12.48	6.25
California	9878	227.14	227.11	-0.03	-4.47	4.42
Colorado	3371	239.67	248.83	9.16	4.59	13.73
Connecticut	417	220.50	240.00	19.50	7.46	31.54
Delaware	3297	241.84	242.39	0.55	-2.32	3.43
Dist. of Columbia	1936	213.29	215.80	2.51	-2.66	7.69
Florida	5187	241.77	244.93	3.16	0.25	6.07
Georgia	4748	231.30	217.74	-13.56	-21.22	-5.89
Hawaii	3443	234.34	243.98	9.64	4.08	15.19
Idaho	3584	240.64	256.48	15.84	10.92	20.75
Illinois	2729	217.63	224.71	7.08	2.24	11.93
Indiana	320	225.45	192.00	-33.46	-47.75	-19.16
Iowa	804	229.43	230.07	0.64	-17.54	18.82
Louisiana	2930	229.28	240.59	11.32	6.76	15.88
Maryland	1569	225.18	214.17	-11.01	-20.02	-2.00
Massachusetts	4142	246.53	245.69	-0.84	-7.55	5.87
Michigan	3337	238.03	237.36	-0.68	-5.09	3.74
Minnesota	3571	246.26	250.06	3.80	-4.37	11.96
Missouri	595	219.01	205.88	-13.13	-22.81	-3.46
Nevada	4033	231.03	226.90	-4.13	-14.77	6.51
New Hampshire	3348	248.51	244.07	-4.43	-15.18	6.32
New Jersey	1241	233.52	225.05	-8.47	-15.55	-1.39
New York	4588	240.73	231.13	-9.60	-18.97	-0.22
North Carolina	5558	240.36	253.55	13.19	7.68	18.69
Ohio	3842	237.47	234.26	-3.20	-9.31	2.90
Oklahoma	338	220.65	202.33	-18.31	-35.88	-0.74
Oregon	3500	235.52	251.09	15.57	-0.58	31.72
Pennsylvania	3479	244.18	248.37	4.19	-11.08	19.46
Rhode Island	3011	235.01	233.09	-1.93	-10.22	6.37
South Carolina	3567	237.56	233.80	-3.76	-21.60	14.07
Tennessee	840	213.92	211.69	-2.24	-13.87	9.40
Texas	8875	239.59	223.68	-15.91	-21.76	-10.05
Utah	3254	242.01	249.71	7.70	1.82	13.57
Wisconsin	3100	244.99	249.34	4.35	-2.26	10.97
Wyoming	2717	243.88	274.94	31.06	14.68	47.44

Table 37: Conditional Inference Trees Level 1 Summary: Grade 4 reading

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	82	234.91	3.46	1645	227.19	0.75	7.72
Alaska	8	208.59	13.72	1149	200.38	1.10	8.21
Arizona	28	203.99	6.26	151	207.23	2.75	-3.24
Arizona	15	175.58	8.50	504	166.79	1.79	8.79
Arizona	186	209.35	2.24	2562	218.37	0.65	-9.02
Arkansas	14	220.43	6.68	1303	231.77	0.76	-11.34
California	101	231.77	2.98	4916	222.03	0.44	9.73
California	72	172.86	3.75	1671	178.30	0.80	-5.44
California	48	192.93	5.02	2013	186.06	0.76	6.87
California	44	203.33	4.71	806	197.98	1.16	5.35
Colorado	139	240.06	2.45	1887	233.80	0.68	6.25
Colorado	6	223.32	8.42	532	195.61	1.37	27.71
Colorado	23	225.35	4.06	711	213.23	1.13	12.12
Connecticut	8	208.95	13.12	421	204.41	1.54	4.54
Delaware	67	227.64	2.91	1919	231.46	0.58	-3.82
Delaware	67	204.55	3.05	394	210.59	1.27	-6.05
Delaware	33	210.83	4.16	497	215.31	1.11	-4.47
Delaware	13	196.82	4.29	27	201.37	4.69	-4.55
Dist. of Columbia	7	258.48	6.66	120	253.43	2.78	5.05
Dist. of Columbia	355	193.44	1.69	1308	192.81	0.91	0.64
Florida	36	238.91	4.06	180	228.19	1.99	10.72
Florida	11	228.56	8.30	182	236.37	2.12	-7.81
Florida	23	231.34	7.18	269	223.34	1.72	7.99
Florida	90	234.61	2.82	2286	231.71	0.59	2.90
Florida	37	218.84	5.50	1780	211.15	0.72	7.68
Georgia	13	248.84	8.20	1988	228.78	0.63	20.06
Georgia	68	213.17	3.15	2429	203.29	0.57	9.87
Hawaii	30	244.01	4.40	548	225.08	1.43	18.93
Hawaii	6	206.35	11.65	1096	200.12	0.96	6.23
Hawaii	39	236.81	4.81	1677	216.90	0.83	19.92
Idaho	10	235.09	10.83	875	205.64	1.04	29.45
Idaho	39	238.55	3.78	1227	228.49	0.80	10.06
Idaho	64	240.69	3.67	1262	230.77	0.85	9.92
Illinois	21	206.78	6.78	1589	204.94	0.85	1.84
Illinois	78	198.57	3.27	1284	195.95	0.89	2.62
Indiana	7	182.89	11.22	331	202.40	1.58	-19.51
Iowa	4	236.80	13.47	2893	224.77	0.56	12.02
Louisiana	6	234.91	12.06	1139	217.78	0.91	17.13
Louisiana	26	256.65	3.71	351	225.93	1.63	30.72
Louisiana	113	209.36	3.18	1082	196.23	0.93	13.12
Louisiana	4	206.07	10.12	234	185.49	1.98	20.58
Louisiana	9	228.65	13.41	55	214.67	4.80	13.98
Maryland	7	193.45	12.52	245	213.56	1.88	-20.11
Maryland	5	209.48	8.38	811	208.23	0.99	1.25
Massachusetts	10	201.65	10.02	591	207.57	1.26	-5.92
Massachusetts	24	213.61	5.43	197	212.96	2.01	0.66

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Massachusetts	24	207.52	5.38	604	203.08	1.13	4.44
Michigan	131	221.54	2.92	2561	226.89	0.60	-5.34
Michigan	202	196.14	2.30	417	196.33	1.58	-0.20
Minnesota	17	210.37	9.10	523	213.38	1.55	-3.01
Minnesota	9	216.63	12.10	605	223.14	1.27	-6.52
Minnesota	9	225.04	9.99	2306	227.13	0.67	-2.09
Missouri	27	185.75	6.41	615	201.32	1.21	-15.57
Nevada	22	207.84	10.18	3739	209.93	0.60	-2.09
New Hampshire	5	253.20	5.58	3321	228.72	0.52	24.49
New Jersey	35	207.33	4.75	1057	212.60	0.95	-5.27
New Mexico	4	198.64	16.31	2871	211.41	0.65	-12.77
New York	23	201.62	5.85	992	207.81	0.92	-6.19
North Carolina	47	240.37	3.92	2056	234.92	0.65	5.46
North Carolina	24	236.93	5.49	664	214.54	1.20	22.40
North Carolina	4	256.76	17.01	1909	201.69	0.71	55.06
North Carolina	4	206.12	14.95	201	190.10	2.38	16.01
Ohio	39	221.25	5.59	2493	228.41	0.56	-7.16
Ohio	4	198.67	20.56	17	207.25	8.37	-8.57
Ohio	33	208.23	3.94	801	201.85	1.02	6.38
Ohio	32	200.29	4.99	317	193.68	1.61	6.62
Oklahoma	5	183.65	6.36	326	205.34	1.57	-21.68
Oregon	15	236.65	5.49	3409	213.90	0.61	22.75
Pennsylvania	106	225.31	2.98	3276	227.43	0.61	-2.12
Rhode Island	11	222.49	6.91	199	173.12	2.53	49.37
Rhode Island	16	225.38	7.64	2795	221.43	0.60	3.95
South Carolina	4	201.92	28.72	3384	215.20	0.57	-13.28
Tennessee	8	208.04	6.23	256	192.81	2.06	15.23
Texas	42	207.29	3.97	2350	215.33	0.57	-8.04
Texas	58	194.04	3.99	1136	201.81	0.82	-7.77
Texas	5	186.06	15.05	418	231.27	1.33	-45.21
Utah	12	183.16	11.43	259	177.72	2.70	5.44
Utah	57	228.06	4.00	3234	225.33	0.53	2.73
Wisconsin	42	165.10	5.64	207	188.20	2.43	-23.10
Wisconsin	15	234.24	9.12	2754	227.84	0.57	6.41
Wyoming	8	242.25	3.77	2696	225.21	0.58	17.04

Table 38: Conditional Inference Trees Level 2 Summary: Grade 4 reading

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2884	216.44	224.35	7.92	-6.01 21.85
Arizona	3446	210.02	203.99	-6.04	-13.42 1.35
Arkansas	1317	231.77	220.43	-11.34	-24.53 1.85
California	9671	204.37	210.37	6.00	1.82 10.19
Colorado	3298	223.00	234.05	11.06	4.62 17.50
Connecticut	429	204.41	208.95	4.54	-21.42 30.50
Delaware	3017	225.04	220.75	-4.28	-8.63 0.06
Dist. of Columbia	1790	197.11	198.06	0.95	-6.37 8.27
Florida	4894	223.61	228.51	4.90	-0.46 10.27
Georgia	4498	214.63	229.04	14.40	5.75 23.06
Hawaii	3396	212.85	228.15	15.31	6.50 24.12
Idaho	3477	223.54	238.48	14.94	7.01 22.88
Illinois	2972	200.82	203.02	2.20	-5.27 9.67
Indiana	338	202.40	182.89	-19.51	-41.81 2.79
Iowa	2897	224.77	236.80	12.02	-14.42 38.47
Louisiana	3019	207.66	225.10	17.44	8.83 26.06
Maryland	1068	209.48	205.69	-3.79	-18.71 11.13
Massachusetts	1450	206.44	206.02	-0.43	-8.84 7.99
Michigan	3311	221.18	216.80	-4.38	-8.39 -0.38
Minnesota	3469	224.28	221.27	-3.02	-14.95 8.92
Missouri	642	201.32	185.75	-15.57	-28.38 -2.76
Nevada	3761	209.93	207.84	-2.09	-22.08 17.89
New Hampshire	3326	228.72	253.20	24.49	13.50 35.47
New Jersey	1092	212.60	207.33	-5.27	-14.78 4.23
New Mexico	2875	211.41	198.64	-12.77	-44.79 19.24
New York	1015	207.81	201.62	-6.19	-17.80 5.43
North Carolina	4909	217.24	244.85	27.60	15.94 39.27
Ohio	3736	219.12	216.26	-2.86	-14.55 8.82
Oklahoma	331	205.34	183.65	-21.68	-34.56 -8.81
Oregon	3424	213.90	236.65	22.75	11.93 33.58
Pennsylvania	3382	227.43	225.31	-2.12	-8.08 3.83
Rhode Island	3021	218.07	225.18	7.11	-3.31 17.52
South Carolina	3388	215.20	201.92	-13.28	-69.59 43.03
Tennessee	264	192.81	208.04	15.23	2.32 28.15
Texas	4009	212.99	201.10	-11.88	-22.44 -1.33
Utah	3562	221.71	224.64	2.94	-9.24 15.11
Wisconsin	3018	224.57	228.54	3.97	-6.82 14.77
Wyoming	2704	225.21	242.25	17.04	9.56 24.51

Table 39: Conditional Inference Trees Level 1 Summary: Grade 8 math

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	67	289.78	3.84	2048	289.10	0.68	0.68
Arizona	21	256.16	6.52	490	262.91	1.52	-6.76
Arizona	5	265.34	13.95	577	257.31	1.36	8.03
Arizona	67	288.27	4.37	1371	285.32	0.88	2.96
Arkansas	10	280.55	10.85	1817	279.84	0.75	0.70
Arkansas	18	261.32	10.10	526	254.38	1.36	6.94
California	5	278.51	7.98	203	277.70	2.26	0.81
California	15	271.98	8.45	260	257.63	1.92	14.34
California	48	271.89	5.01	494	264.33	1.60	7.56
California	47	248.33	5.05	1471	250.30	0.92	-1.97
California	81	293.09	3.86	1425	288.54	0.93	4.55
California	87	272.35	3.96	1021	260.72	1.17	11.63
California	50	280.51	5.99	1449	271.25	0.98	9.26
California	7	278.31	5.33	100	277.72	3.56	0.59
Colorado	18	287.80	7.49	566	285.00	1.29	2.80
Colorado	87	305.52	3.72	1259	296.64	0.92	8.88
Delaware	34	269.19	5.25	785	269.68	0.99	-0.49
Delaware	136	296.58	2.94	1664	289.03	0.75	7.55
Dist. of Columbia	10	233.23	8.37	69	199.98	3.11	33.25
Dist. of Columbia	179	247.70	1.87	453	236.32	1.17	11.39
Dist. of Columbia	383	263.17	1.48	602	249.54	1.38	13.63
Florida	99	279.85	3.31	2810	279.71	0.63	0.15
Florida	51	272.90	4.28	448	277.76	1.59	-4.87
Florida	18	260.69	5.29	385	262.25	1.77	-1.57
Georgia	8	253.12	8.49	1465	284.97	0.82	-31.85
Georgia	56	271.28	5.20	1827	258.77	0.69	12.51
Hawaii	108	267.01	3.43	1574	272.34	0.84	-5.33
Hawaii	7	242.16	10.08	653	262.83	1.46	-20.67
Hawaii	16	272.78	8.89	326	263.72	2.17	9.06
Idaho	18	279.51	6.68	1723	275.94	0.74	3.56
Idaho	41	308.34	3.80	989	296.32	0.99	12.02
Illinois	33	280.61	5.56	3766	274.13	0.58	6.48
Indiana	11	230.84	6.58	312	259.95	1.60	-29.11
Kansas	17	293.15	7.91	2595	289.61	0.60	3.54
Louisiana	16	307.11	6.53	409	286.75	1.20	20.36
Louisiana	4	316.06	4.32	730	279.96	0.94	36.10
Louisiana	67	269.10	3.84	966	259.26	0.85	9.84
Louisiana	4	322.18	8.04	10	279.72	11.64	42.46
Maryland	6	306.91	18.57	2593	285.43	0.70	21.48
Massachusetts	54	294.20	4.94	3265	292.18	0.61	2.02
Michigan	29	275.43	6.97	1424	288.08	0.84	-12.65
Michigan	29	271.03	6.94	562	275.54	1.38	-4.51
Michigan	69	245.27	3.35	376	244.08	1.57	1.19
Minnesota	12	277.36	8.41	130	283.31	3.25	-5.96
Minnesota	4	270.14	15.67	282	262.93	1.95	7.21
Missouri	4	242.24	17.81	181	264.16	2.07	-21.92

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Missouri	30	237.91	3.76	320	248.83	1.46	-10.93
New Mexico	16	266.13	8.91	1224	264.54	0.91	1.59
New Mexico	34	277.18	4.62	994	272.83	0.97	4.35
New Mexico	4	272.74	25.54	70	261.09	3.13	11.65
New York	6	232.85	10.95	731	263.59	1.06	-30.75
New York	8	201.46	7.33	105	231.11	2.45	-29.65
North Carolina	61	287.23	4.20	3804	282.97	0.56	4.26
North Carolina	10	236.94	10.95	149	261.11	2.85	-24.17
Ohio	28	247.00	4.86	529	251.29	1.09	-4.30
Ohio	11	258.49	7.82	584	259.71	1.30	-1.23
Oregon	15	276.91	8.31	1612	275.14	0.82	1.76
Oregon	11	292.60	8.03	731	301.78	1.19	-9.18
Oregon	15	310.94	7.51	187	277.85	2.43	33.09
Pennsylvania	15	277.44	6.61	2233	291.77	0.67	-14.33
Pennsylvania	12	234.94	7.99	104	271.67	3.09	-36.72
Pennsylvania	4	221.82	16.35	5	257.64	24.77	-35.82
Pennsylvania	11	255.83	5.82	164	251.29	2.53	4.54
Pennsylvania	22	251.62	4.52	79	258.57	4.32	-6.95
Rhode Island	25	272.38	5.78	576	251.38	1.37	21.00
Rhode Island	5	317.10	17.61	1935	285.60	0.73	31.50
South Carolina	16	301.75	6.34	1264	293.58	0.91	8.17
Tennessee	53	263.68	3.24	705	252.82	1.08	10.86
Texas	41	271.81	4.55	969	267.20	0.93	4.60
Texas	18	295.12	7.79	2060	291.96	0.73	3.16
Texas	54	284.38	4.29	2122	277.13	0.66	7.26
Texas	69	301.77	4.34	1075	287.69	1.05	14.08
Utah	37	286.05	6.29	2628	281.16	0.67	4.90
Wisconsin	31	292.39	5.56	2025	292.19	0.67	0.20
Wisconsin	30	255.94	5.98	317	257.82	2.02	-1.88
Wisconsin	37	270.64	4.97	109	265.92	3.25	4.71

Table 40: Conditional Inference Trees Level 2 Summary: Grade 8 math

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2115	289.10	289.78	0.68	-6.96 8.32
Arizona	2531	274.35	276.51	2.16	-8.40 12.72
Arkansas	2371	274.00	276.13	2.13	-12.48 16.75
California	6763	267.87	273.62	5.75	1.45 10.06
Colorado	1930	293.12	300.16	7.04	-1.30 15.39
Delaware	2619	282.98	288.01	5.04	-0.99 11.06
Dist. of Columbia	1696	242.30	256.01	13.71	7.55 19.87
Florida	3811	277.61	276.92	-0.69	-5.89 4.51
Georgia	3356	270.27	263.31	-6.96	-16.78 2.86
Hawaii	2684	268.90	261.63	-7.27	-16.51 1.98
Idaho	2771	283.52	290.22	6.71	-0.93 14.34
Illinois	3799	274.13	280.61	6.48	-4.47 17.43
Indiana	323	259.95	230.84	-29.11	-42.44 -15.78
Kansas	2612	289.61	293.15	3.54	-12.01 19.10
Louisiana	2206	271.58	292.39	20.81	12.62 29.00
Maryland	2599	285.43	306.91	21.48	-14.96 57.92
Massachusetts	3319	292.18	294.20	2.02	-7.75 11.78
Michigan	2489	277.24	268.99	-8.24	-15.19 -1.30
Minnesota	428	269.70	272.53	2.84	-15.03 20.71
Missouri	535	254.13	239.41	-14.73	-32.77 3.32
New Mexico	2342	268.07	271.19	3.12	-14.95 21.20
New York	850	259.28	228.68	-30.60	-43.80 -17.40
North Carolina	4024	282.10	285.24	3.13	-8.71 14.98
Ohio	1152	255.64	252.93	-2.71	-11.90 6.48
Oregon	2571	283.04	284.11	1.07	-8.13 10.26
Pennsylvania	2649	286.83	272.98	-13.86	-26.73 -0.98
Rhode Island	2541	277.51	306.52	29.01	10.78 47.25
South Carolina	1280	293.58	301.75	8.17	-4.40 20.74
Tennessee	758	252.82	263.68	10.86	4.16 17.56
Texas	6408	282.26	288.99	6.73	1.33 12.13
Utah	2665	281.16	286.05	4.90	-7.51 17.30
Wisconsin	2549	286.00	286.18	0.18	-6.57 6.92

Table 41: Conditional Inference Trees Level 1 Summary: Grade 8 reading

State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
Alaska	73	268.61	3.18	2541	260.54	0.63	8.07
Arizona	84	263.47	3.74	1536	262.10	0.85	1.37
Arizona	23	246.42	7.74	1017	241.04	1.04	5.37
Arkansas	17	247.98	5.97	681	252.51	1.20	-4.53
Arkansas	14	262.64	9.58	1752	260.15	0.74	2.49
California	65	227.60	4.71	2296	238.87	0.71	-11.27
California	112	249.13	4.26	2378	249.41	0.75	-0.28
California	45	276.98	4.25	990	273.48	0.95	3.50
California	130	256.60	3.22	1591	248.60	0.94	7.99
Colorado	33	284.60	3.83	975	266.21	0.84	18.39
Colorado	4	275.69	18.14	738	248.21	1.06	27.48
Colorado	69	288.63	3.18	945	276.85	0.91	11.78
Delaware	60	261.48	3.48	1217	261.36	0.77	0.12
Delaware	54	269.58	3.99	821	260.22	0.95	9.37
Delaware	57	292.36	3.16	453	278.48	1.26	13.87
Delaware	24	292.73	5.74	89	261.78	3.53	30.95
Dist. of Columbia	196	243.27	1.80	508	226.81	1.26	16.45
Dist. of Columbia	362	253.85	1.45	617	240.85	1.30	13.00
Florida	14	281.30	8.78	118	265.30	2.97	16.00
Florida	67	274.24	2.89	1518	269.12	0.74	5.12
Florida	21	263.06	6.23	995	248.50	1.04	14.57
Florida	93	264.85	2.83	1164	254.78	0.99	10.07
Georgia	54	253.61	3.66	1922	244.80	0.66	8.80
Georgia	9	269.05	11.81	1535	269.31	0.74	-0.26
Hawaii	106	255.37	2.56	2309	250.01	0.69	5.37
Hawaii	35	269.54	5.06	352	261.96	1.81	7.58
Idaho	23	263.45	6.62	1784	258.76	0.67	4.70
Idaho	38	294.15	3.58	1045	274.93	0.79	19.21
Illinois	8	266.40	12.94	2429	267.07	0.60	-0.67
Illinois	9	268.31	6.98	475	254.25	1.44	14.06
Illinois	4	257.49	20.30	497	233.72	1.42	23.76
Illinois	21	255.42	3.65	562	248.45	1.21	6.97
Indiana	13	247.23	6.33	333	243.15	1.55	4.09
Kansas	17	261.84	8.15	2782	267.21	0.54	-5.36
Louisiana	14	289.86	7.44	1003	260.04	0.83	29.82
Louisiana	14	290.71	6.81	295	271.97	1.62	18.74
Louisiana	72	253.53	3.43	921	244.83	0.79	8.70
Maryland	6	289.07	7.61	2663	265.23	0.60	23.85
Massachusetts	57	279.09	4.41	3522	268.25	0.53	10.84
Michigan	89	251.61	2.60	418	232.70	1.51	18.91
Michigan	42	267.13	5.10	2057	266.19	0.65	0.94
Minnesota	4	283.16	10.37	305	243.97	2.04	39.20
Minnesota	11	255.40	11.45	140	258.29	2.75	-2.90
Missouri	43	231.61	4.35	388	239.79	1.57	-8.18
New Mexico	58	255.58	3.02	2587	250.07	0.61	5.52
New York	6	199.12	3.35	122	213.50	2.75	-14.38

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State	Charter Schools			Public Schools			Diff
	n	Score	SE	n	Score	SE	
New York	6	224.95	9.02	733	250.07	1.03	-25.12
North Carolina	11	202.68	13.47	159	235.49	2.97	-32.81
North Carolina	65	268.56	3.50	3979	258.94	0.54	9.63
Ohio	38	245.91	5.08	1293	247.50	0.73	-1.58
Ohio	5	218.77	18.40	88	220.31	3.02	-1.54
Oregon	10	286.17	8.71	1738	271.45	0.69	14.73
Oregon	15	262.42	6.25	688	246.56	1.24	15.86
Oregon	19	287.80	4.48	200	266.82	2.26	20.99
Pennsylvania	27	252.30	5.10	114	254.34	3.07	-2.05
Pennsylvania	18	248.08	5.49	223	244.64	1.91	3.44
Pennsylvania	19	269.32	4.65	2413	270.90	0.61	-1.57
Rhode Island	7	252.76	10.43	368	229.04	1.57	23.72
Rhode Island	19	258.92	4.69	255	245.49	1.86	13.44
Rhode Island	5	284.81	17.18	2084	267.85	0.65	16.96
South Carolina	18	283.05	3.99	1389	268.81	0.75	14.24
Tennessee	20	241.11	5.92	469	236.51	1.37	4.60
Tennessee	28	250.73	4.80	249	243.06	1.84	7.66
Texas	52	249.31	3.84	1055	247.02	0.86	2.29
Texas	39	257.71	4.45	2861	264.08	0.62	-6.37
Texas	43	267.71	3.02	1118	251.26	0.89	16.45
Texas	66	282.18	3.27	1201	263.40	0.96	18.78
Utah	39	274.85	5.59	836	251.02	1.12	23.83
Wisconsin	45	247.38	4.72	103	248.90	3.16	-1.52
Wisconsin	35	266.57	5.75	2242	268.98	0.63	-2.41
Wisconsin	29	225.19	8.90	202	233.78	2.34	-8.59

Table 42: Conditional Inference Trees Level 2 Summary: Grade 8 reading

State	n	Public	Charter	Diff	Confidence Interval
Alaska	2614	260.54	268.61	8.07	1.71
Arizona	2660	253.87	256.80	2.94	-5.60
Arkansas	2464	257.98	258.49	0.50	-10.65
California	7607	249.23	247.93	-1.30	-5.45
Colorado	2764	265.28	283.68	18.40	6.06
Delaware	2775	264.16	270.98	6.82	2.26
Dist. of Columbia	1683	234.98	249.43	14.45	11.57
Florida	3990	259.23	268.67	9.44	3.57
Georgia	3520	255.55	260.38	4.83	-7.33
Hawaii	2802	251.66	257.33	5.67	-0.20
Idaho	2890	264.82	274.96	10.14	2.69
Illinois	4005	258.64	263.92	5.28	-7.19
Indiana	346	243.15	247.23	4.09	-8.73
Kansas	2799	267.21	261.84	-5.36	-21.37
Louisiana	2319	255.12	274.42	19.30	12.22
Maryland	2669	265.23	289.07	23.85	8.88
Massachusetts	3579	268.25	279.09	10.84	2.14
Michigan	2606	259.68	264.11	4.43	-1.40
Minnesota	460	248.67	274.05	25.38	9.83
Missouri	431	239.79	231.61	-8.18	-17.28
New Mexico	2645	250.07	255.58	5.52	-0.53
New York	867	244.67	221.14	-23.53	-33.41
North Carolina	4214	257.99	265.91	7.92	-6.04
Ohio	1424	245.72	244.14	-1.58	-20.55
Oregon	2670	264.51	280.05	15.54	7.75
Pennsylvania	2814	267.82	266.65	-1.17	-7.41
Rhode Island	2738	260.30	277.83	17.53	3.95
South Carolina	1407	268.81	283.05	14.24	6.28
Tennessee	766	238.88	244.59	5.71	-2.11
Texas	6435	258.70	262.89	4.19	0.48
Utah	875	251.02	274.85	23.83	12.63
Wisconsin	2656	264.80	261.90	-2.90	-10.92
					5.11

Appendix I

Heat Maps of Relative Importance of Covariates Identified from Conditional Inference Tree Analysis

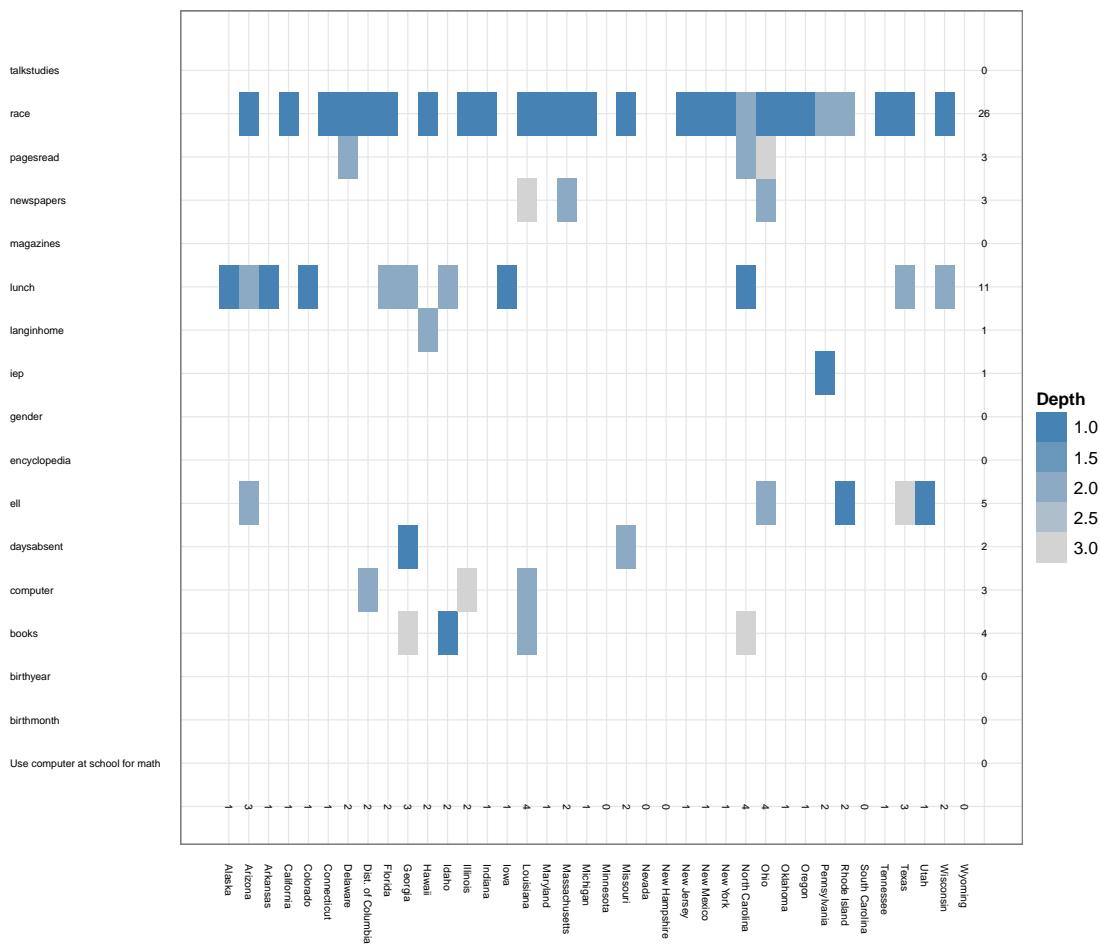


Figure 17: Heat Map of Relative Importance of Covariates for Phase I: Grade 4 Math

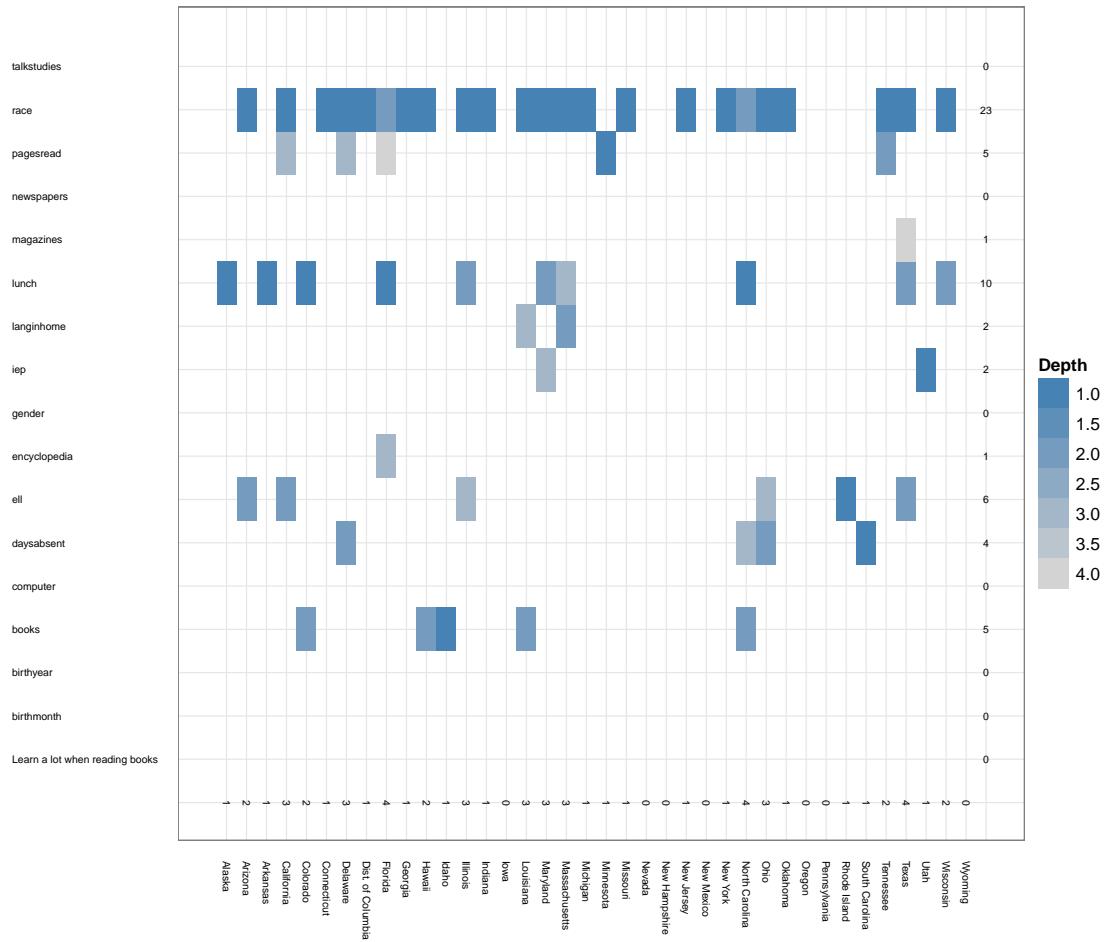


Figure 18: Heat Map of Relative Importance of Covariates for Phase I: Grade 4 Reading

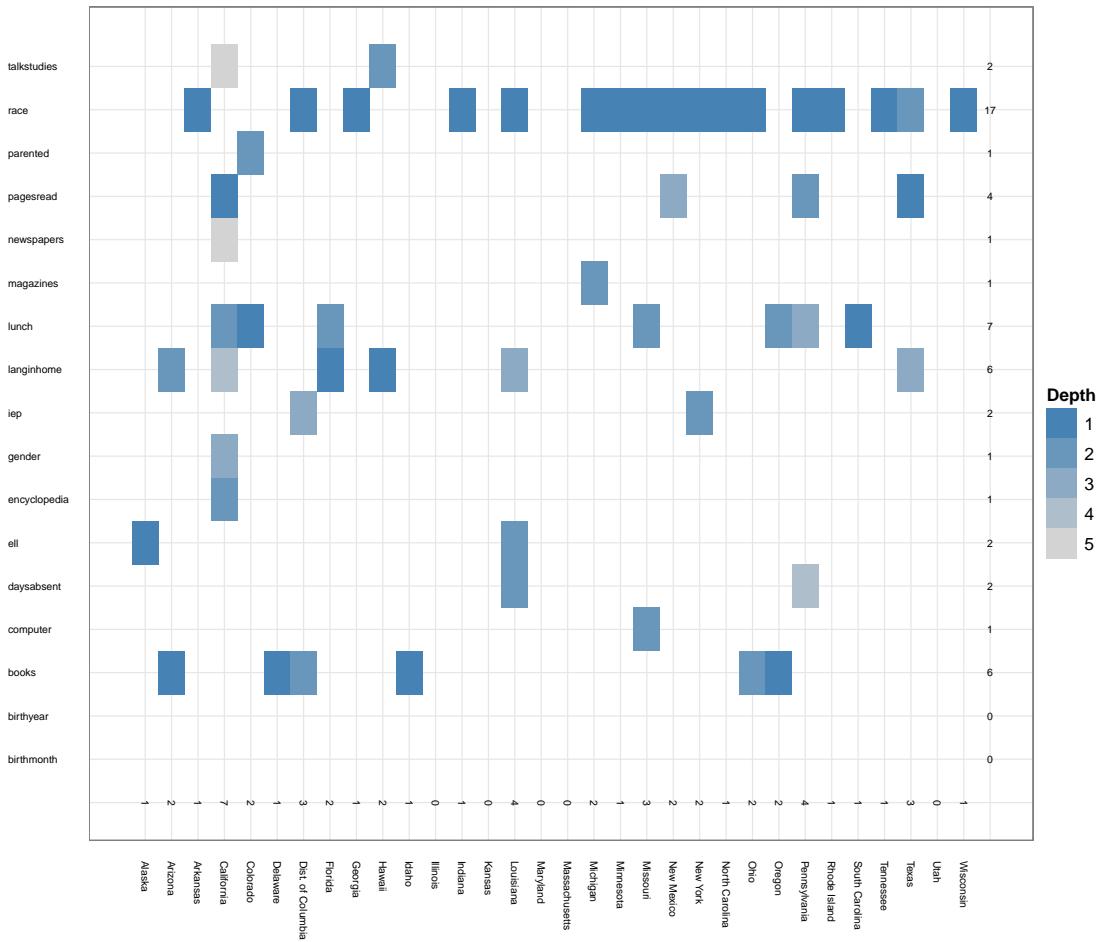


Figure 19: Heat Map of Relative Importance of Covariates for Phase I: Grade 8 Math

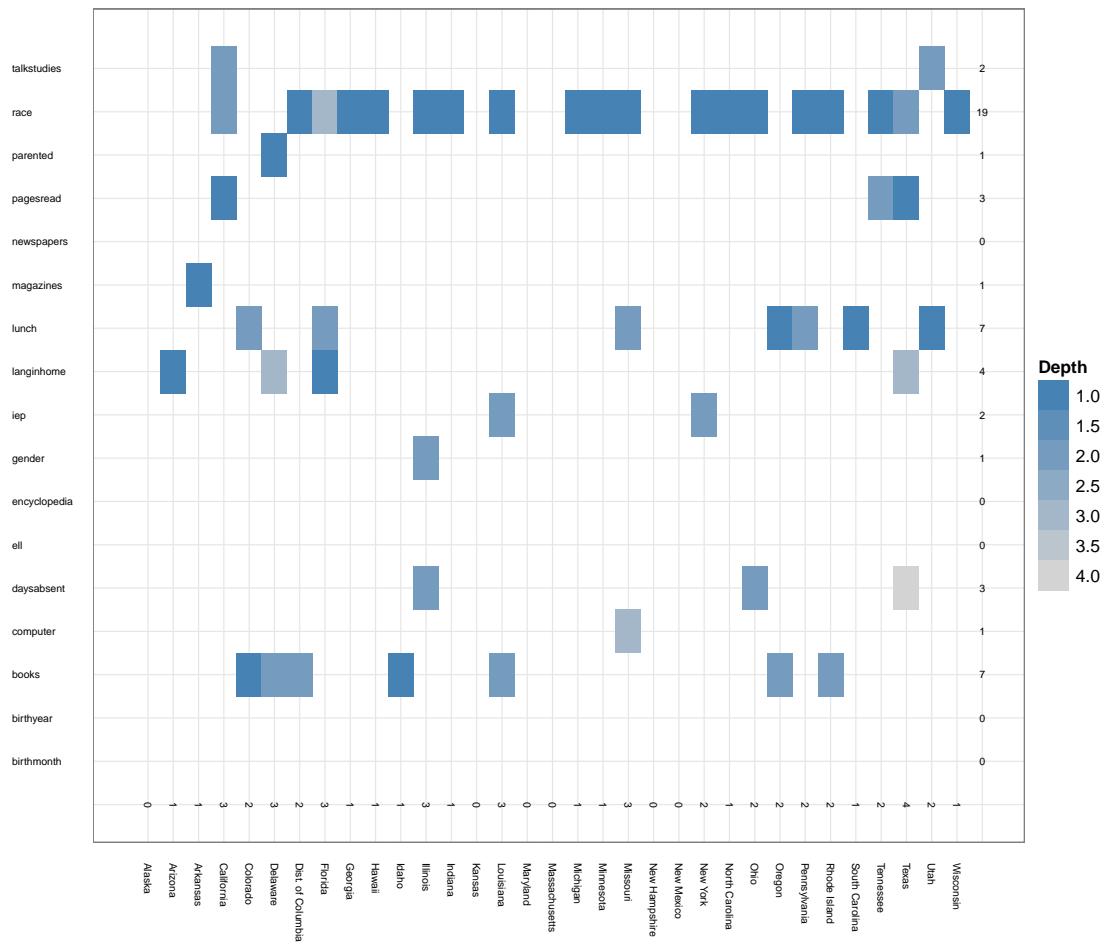


Figure 20: Heat Map of Relative Importance of Covariates for Phase I: Grade 8 Reading

Appendix J

Distribution of NAEP Scores for Matched vs. Unmatched Public School Students

The figures in this appendix represent the distributions of matched and unmatched public school students as identified by the full logistic regression model. These models were chosen since they resulted in the largest number of unmatched public school students vis-à-vis stratification. It should be noted that for some states there may be only one density line. This indicates that all public school students within that state were either all matched or all not matched.

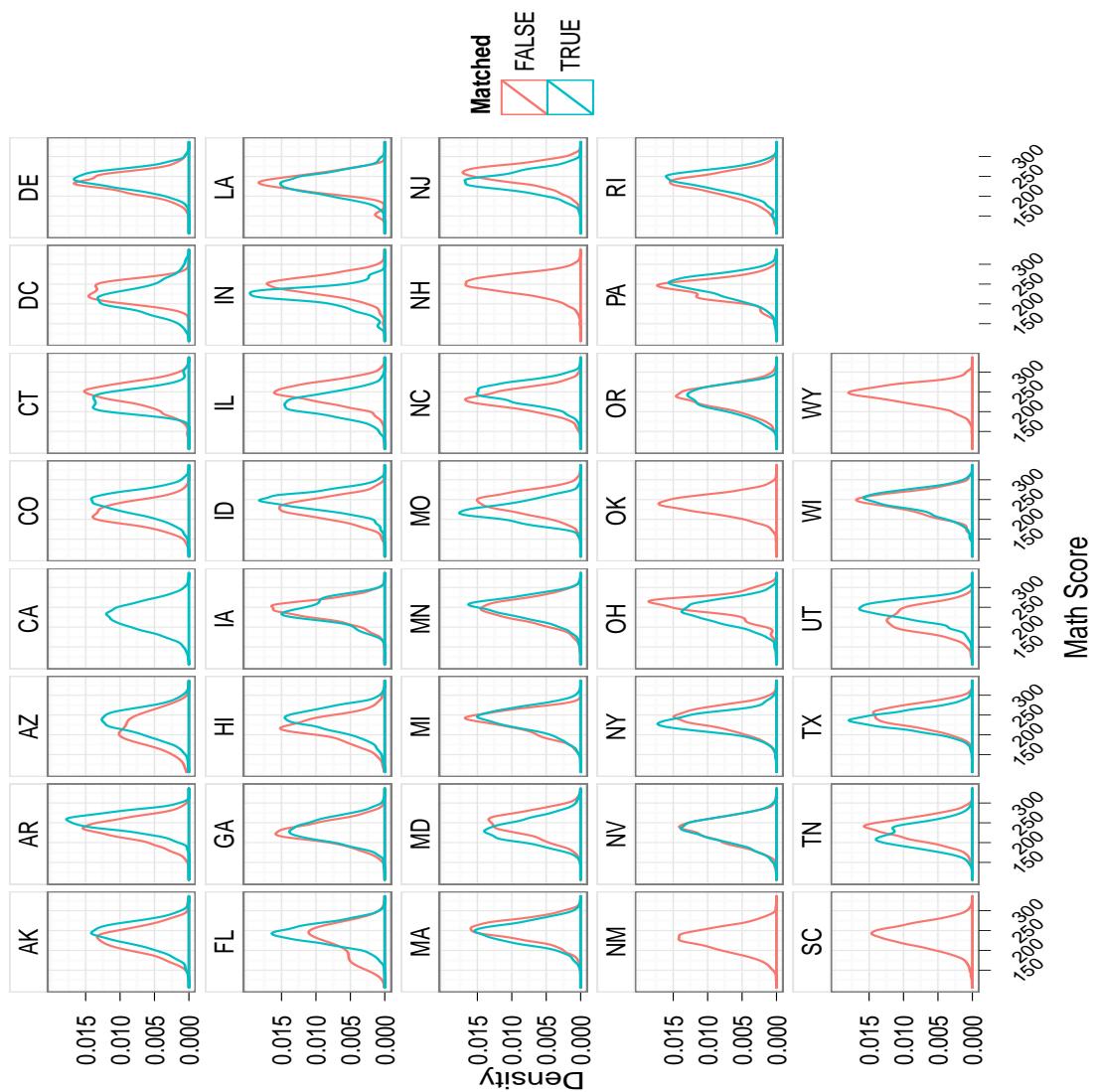


Figure 21: Density Distribution of Grade 4 Math: Matched vs. Unmatched Public School Students

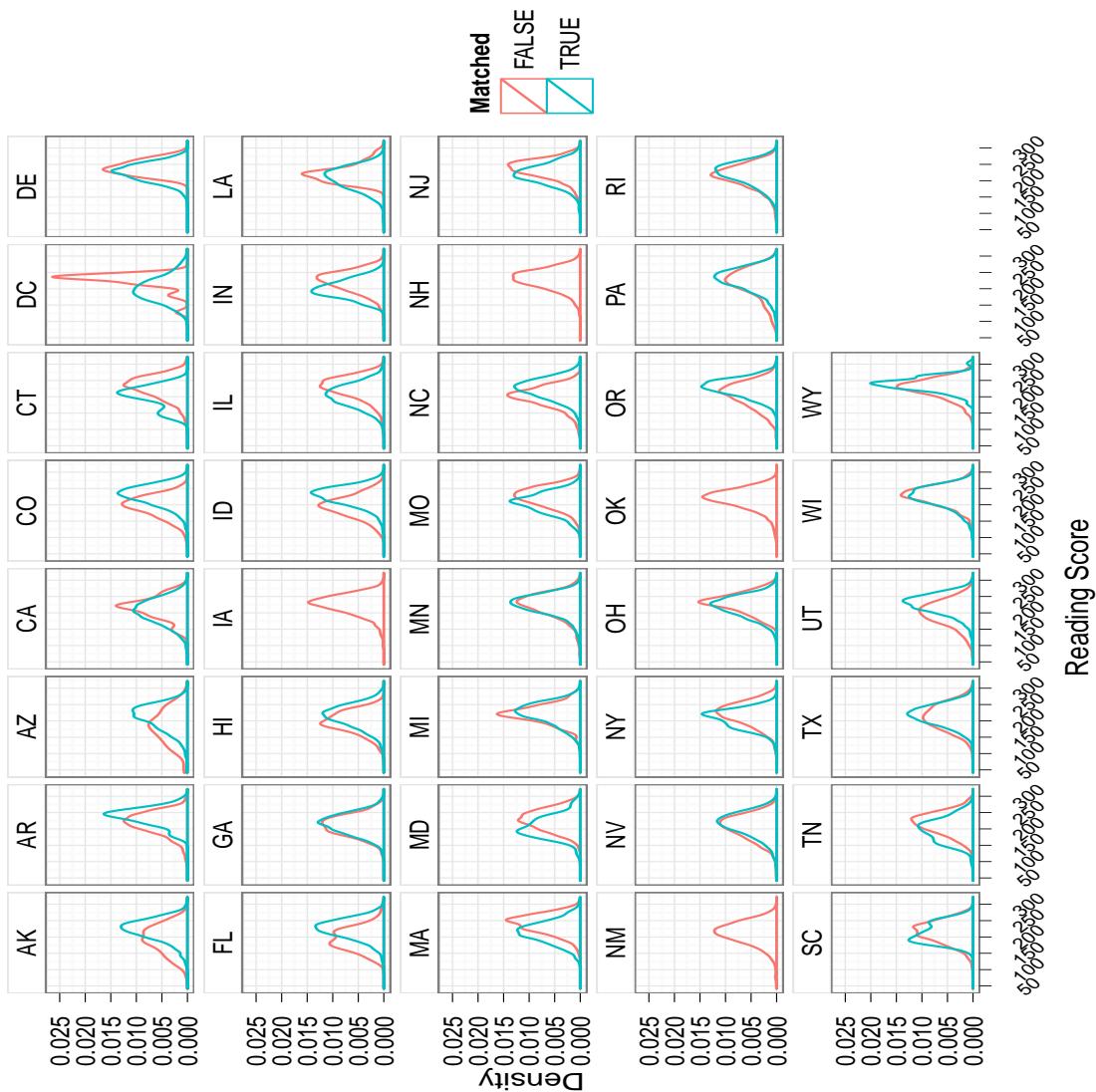


Figure 22: Density Distribution of Grade 4 Reading: Matched vs. Unmatched Public School Students

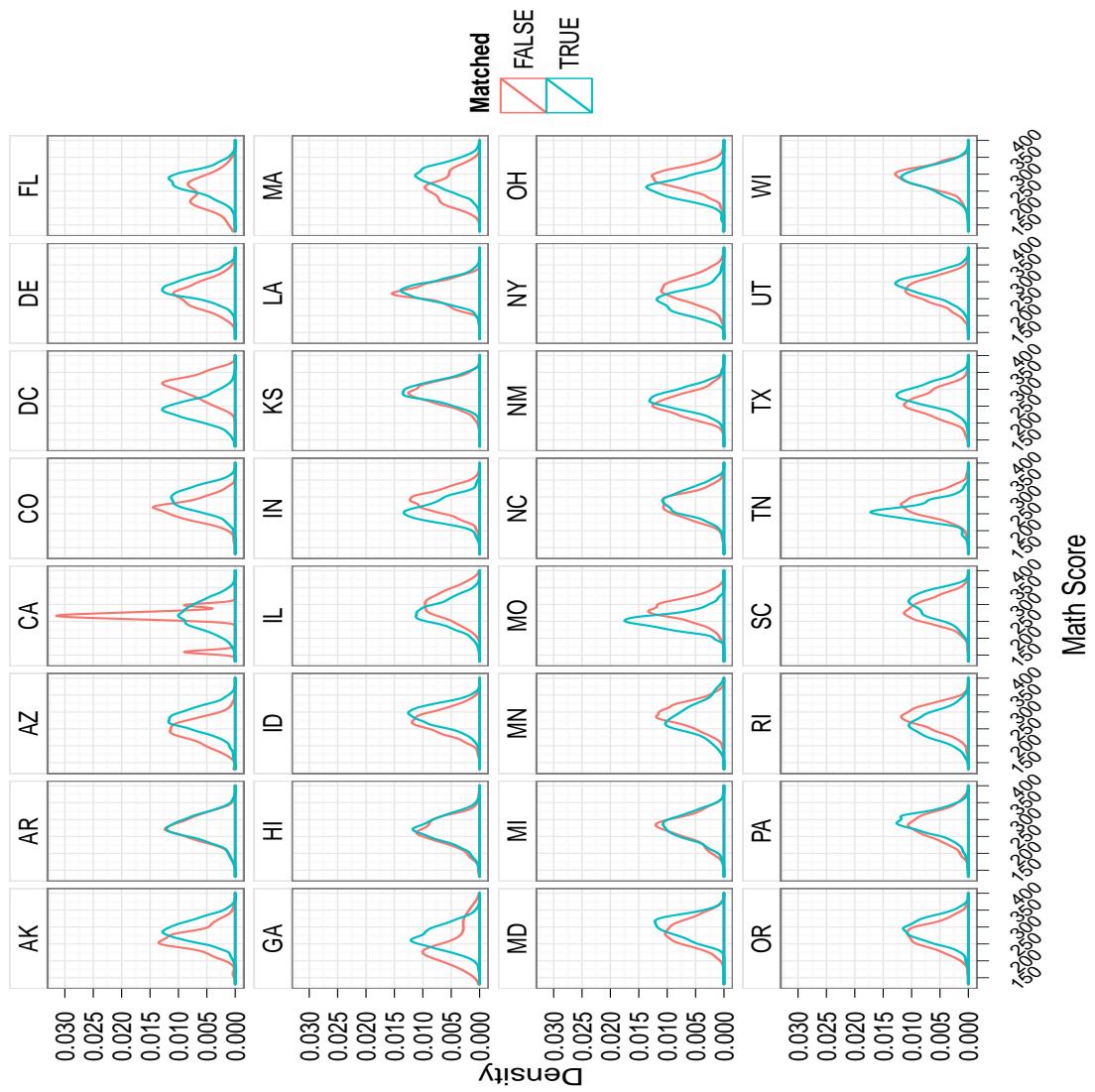


Figure 23: Density Distribution of Grade 8 Math: Matched vs. Unmatched Public School Students

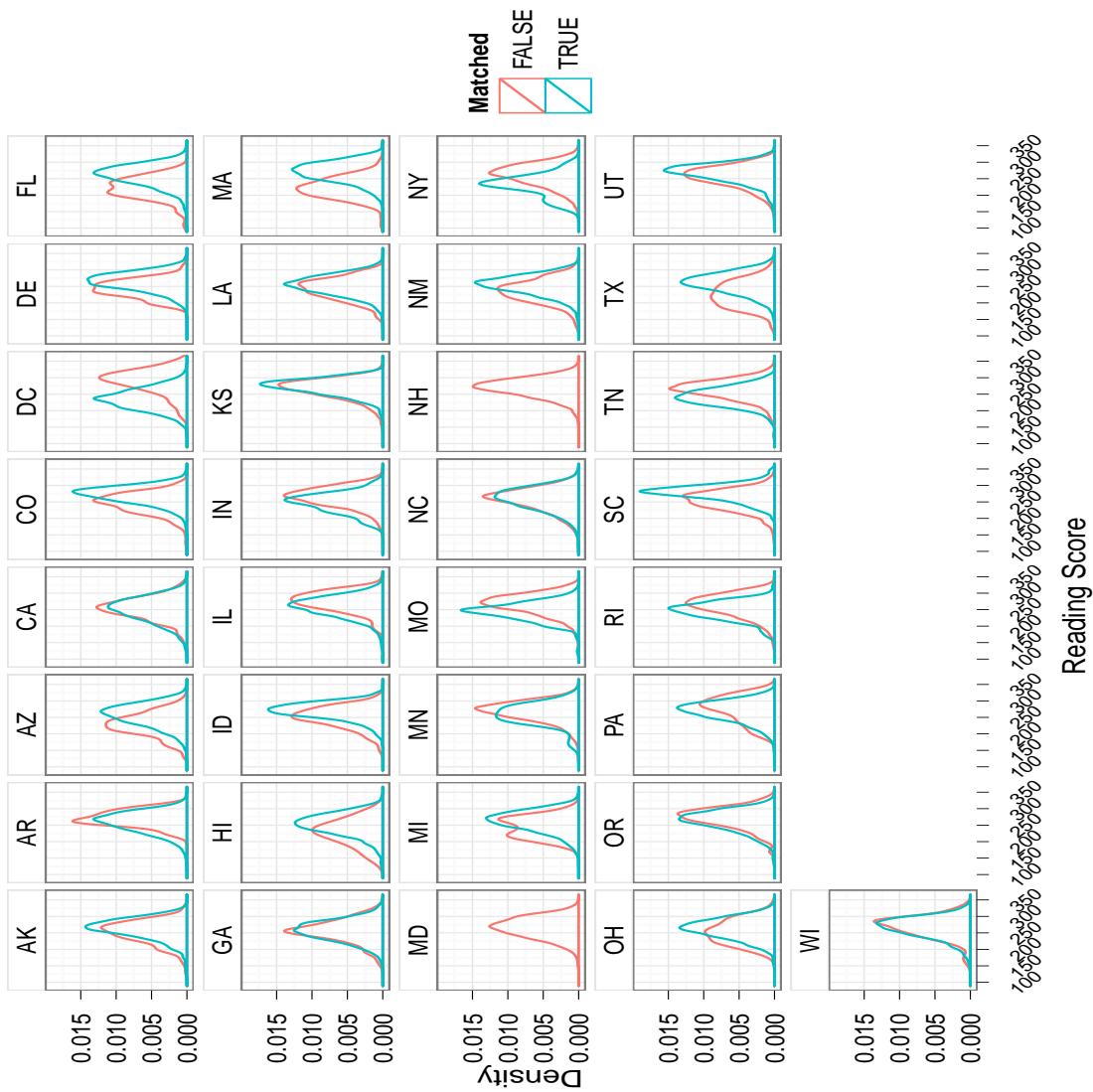


Figure 24: Density Distribution of Grade 8 Reading: Matched vs. Unmatched Public School Students