Comparing Charter & Traditional Public Schools Using Propensity Score Analysis

Jason Bryer <jason@bryer.org>
University at Albany
www.bryer.org

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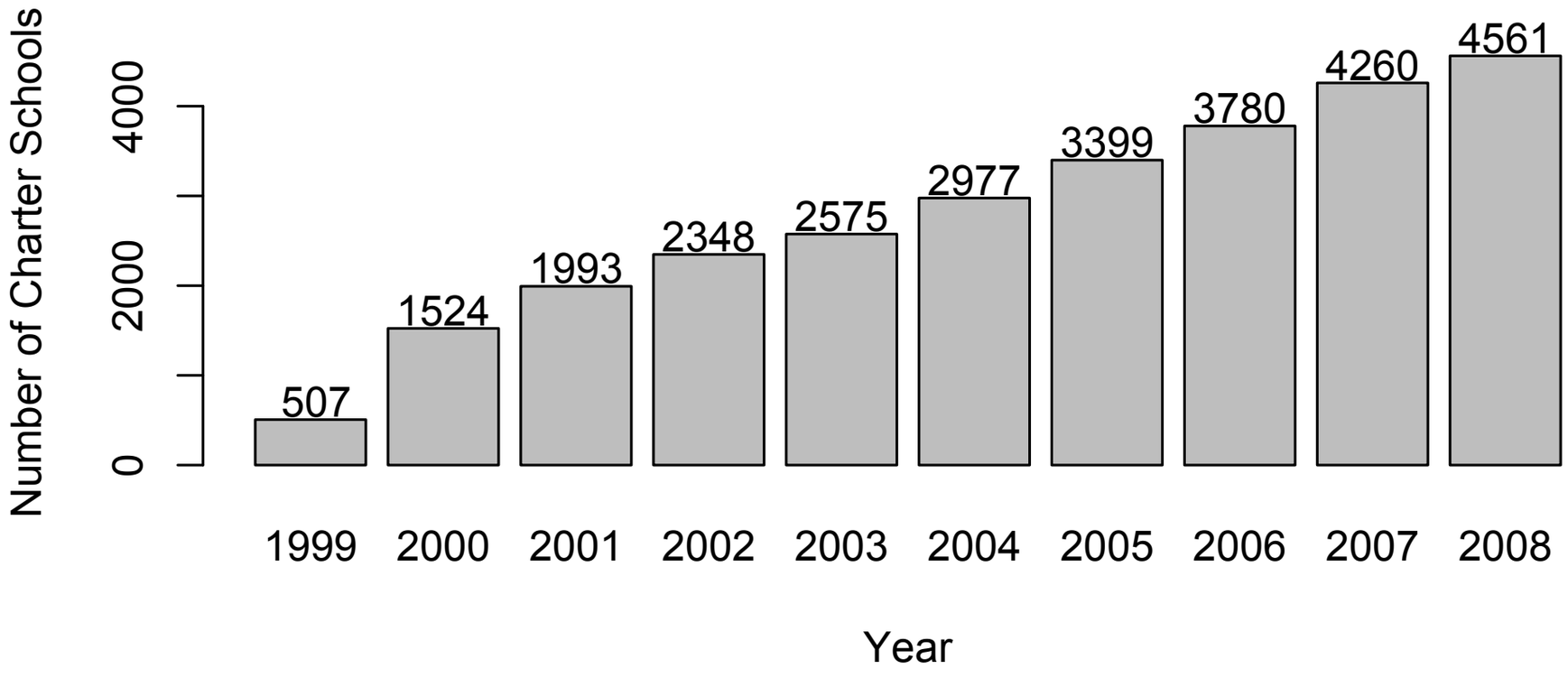
Charter Schools

- Charter Schools are an alternative to traditional public schools but are still public.
- They are relieved of many of the bureaucratic and regulatory constraints public schools adhere to...
- But are accountable for student performance



National Studies

- Although there are a lot of studies examining the effectiveness of charter schools, there are few national studies.
- Braun, Jenkins, and Grigg (2006) analyzed the 2005 NAEP using HLM and found that charter schools performed the same or significantly worse than traditional public school students.
- The Center for Research on Education Reform (CREDO; 2009) conducted a study of approximately 1.7 million students within 16 states using matching procedures. Found that charter schools students performed significantly lower than traditional public school students.

Guiding Research Questions

- Are there differences between charter and public schools?
- And if so, what is the nature and extent of those differences?

  Moreover, given the differences in charter school laws between states,

- What are the differences between and within states?

Propensity Score Analysis

- PSA (Rosenbaum & Rubin, 1983) is a statistical procedure that attempts mediate selection bias in observational studies.
- PSA is typically conducted in two phases:
  - Phase I: Estimate the likelihood of a being in the treatment using available covariates.
  - Phase II: Compare treated and comparison groups with similar covariate profiles.

National Assessment of Educational Progress (NAEP)

- In 2003 NCES began assessing charter schools in addition to traditional public schools and private schools.
- This study will utilize the 2007 data which assessed fourth and eighth grade students in math and reading.
- Includes over 6,000 public schools and 200 charter schools.

Covariates

- Are you Hispanic or Latino?
- Which of the following best describes you?
- 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 thinks 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?

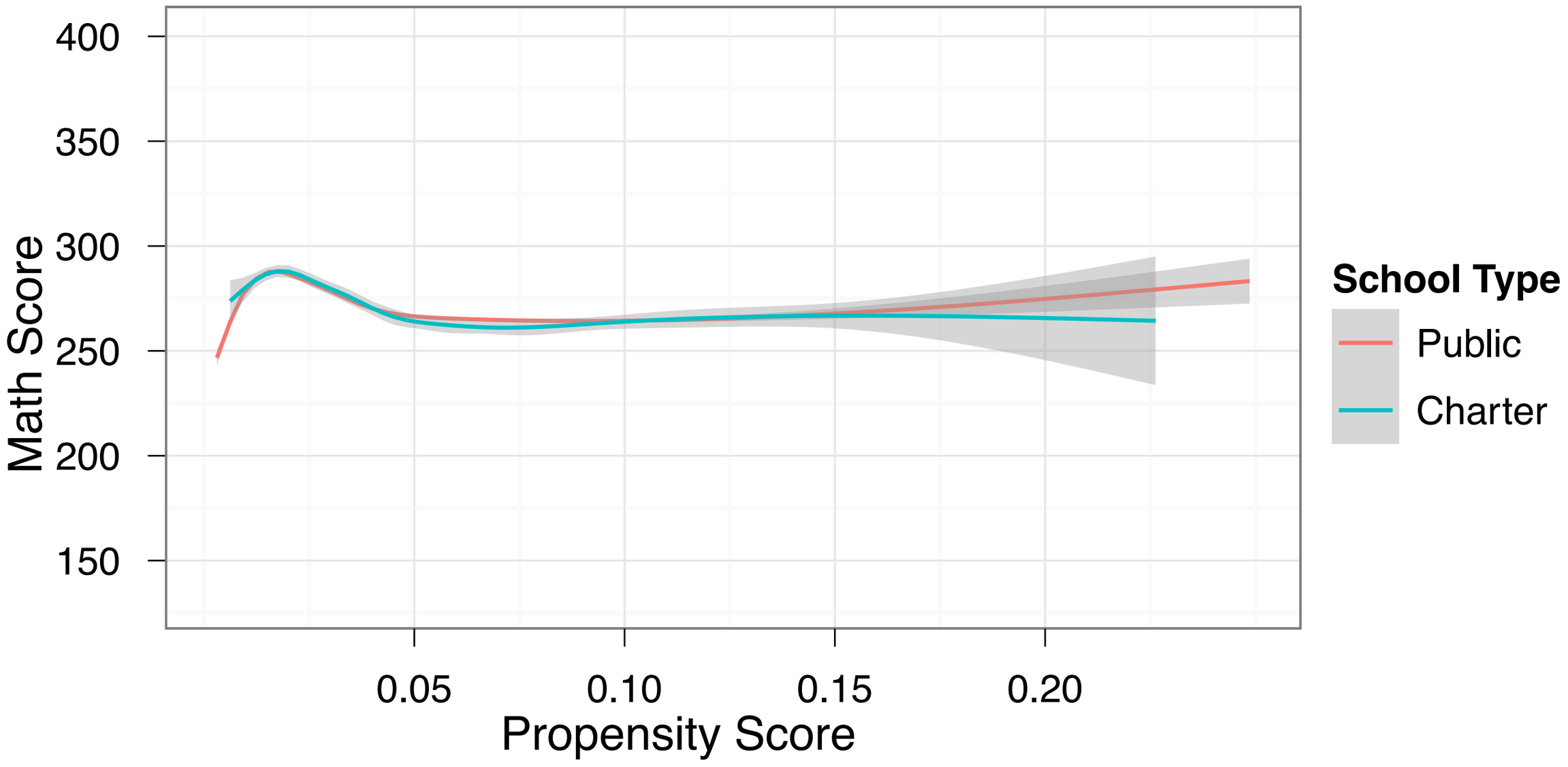
Location as a Covariate

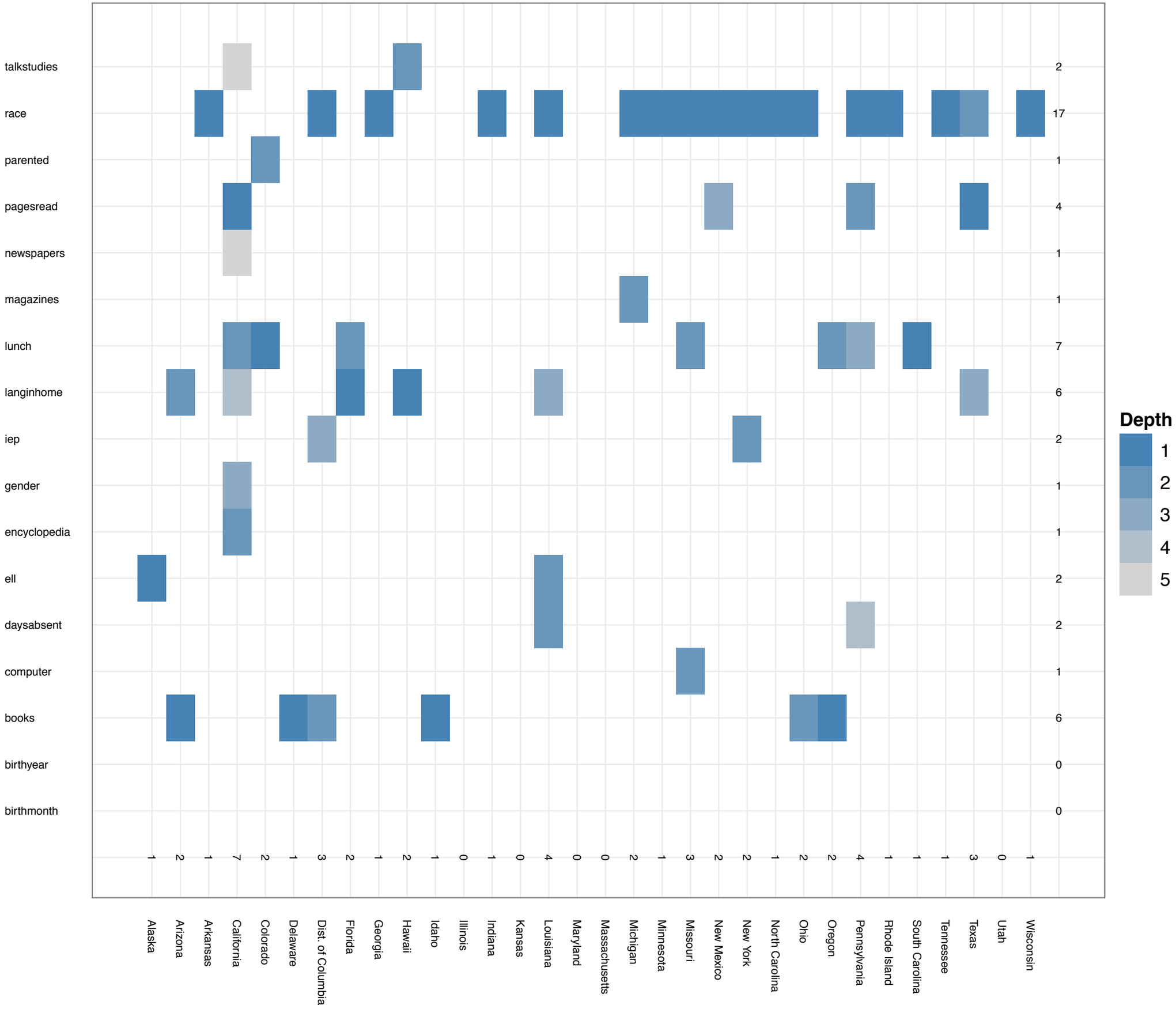
- Traditional public schools in states that do not have charter school laws are omitted from the analysis.
- Location is an important factor for school choice.
- Students travel an average of five miles to school (National School Transportation Association)
- Using the Common Core of Data, traditional public schools located within five miles of a charter school will be used for the comparison group.

Method

1. Propensity score analysis using stratification.
   1.1. Full logistic regression.
   1.2. Logistic regression with step AIC.
   1.3. Conditional inference trees.
2. Propensity score matching
   2.1. One-to-one
   2.2. One-to-five
   2.3. One-to-ten.
   A dependent sample analysis will be performed on the resulting matched pairs (Austin, 2011).
3. Multilevel propensity score analysis.
   3.1. Full logistic regression.
   3.2. Logistic regression with step AIC.
   3.3. Conditional inference trees.

Logistic Regression (Grade 8 Math)

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Indiana
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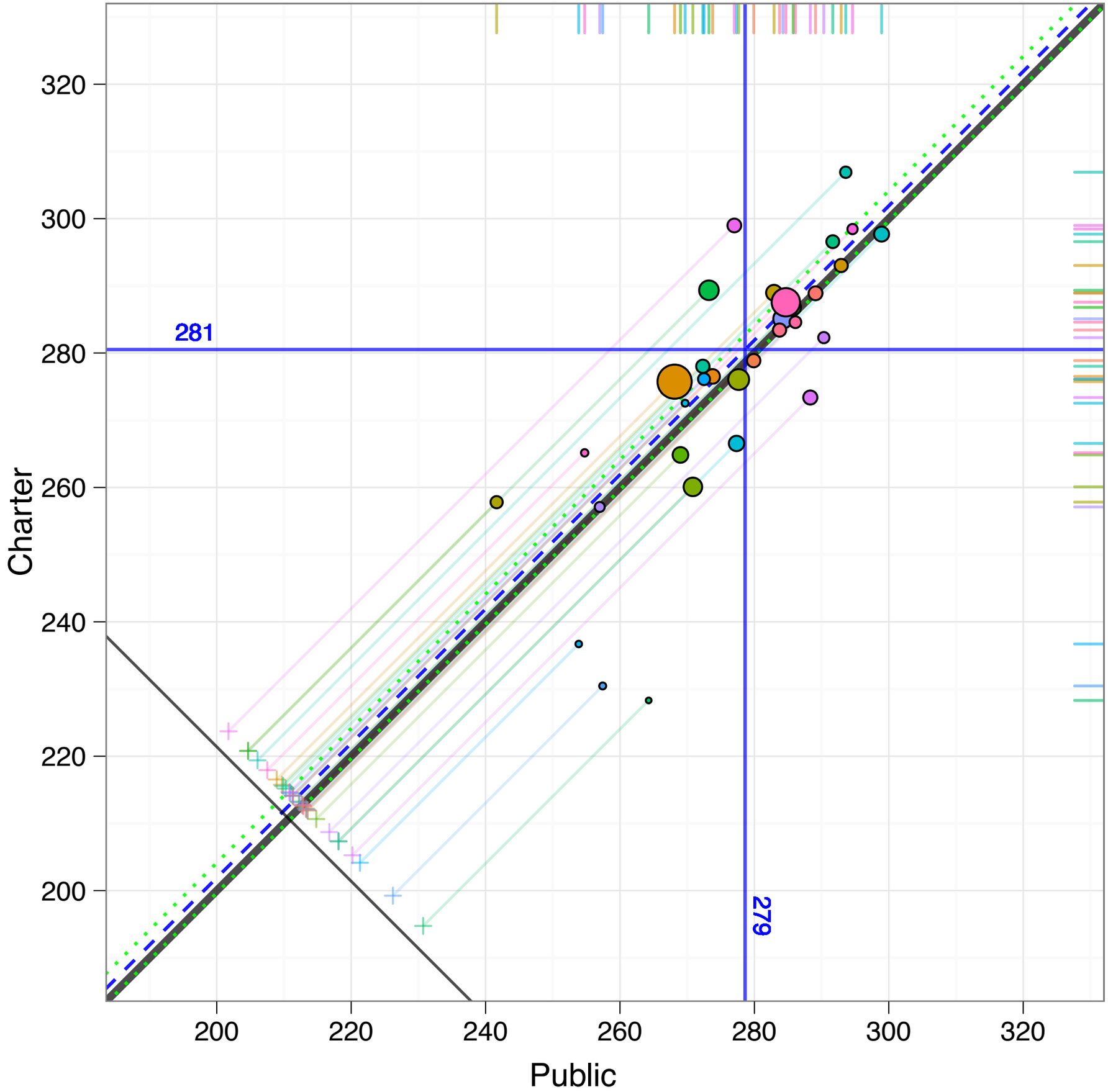
South Carolina
Tennessee
Texas
Utah
Wisconsin


320
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Charter
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Public
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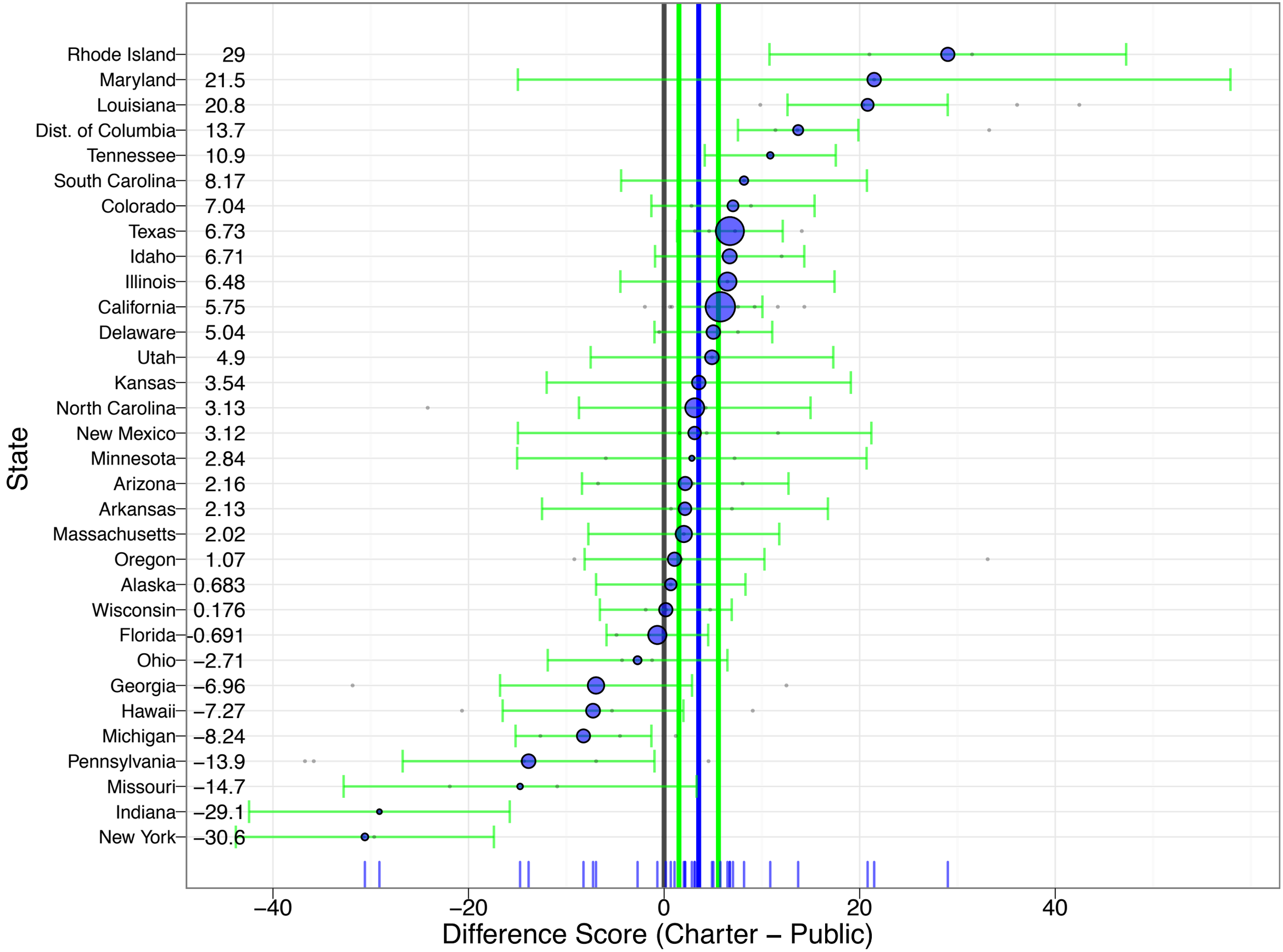
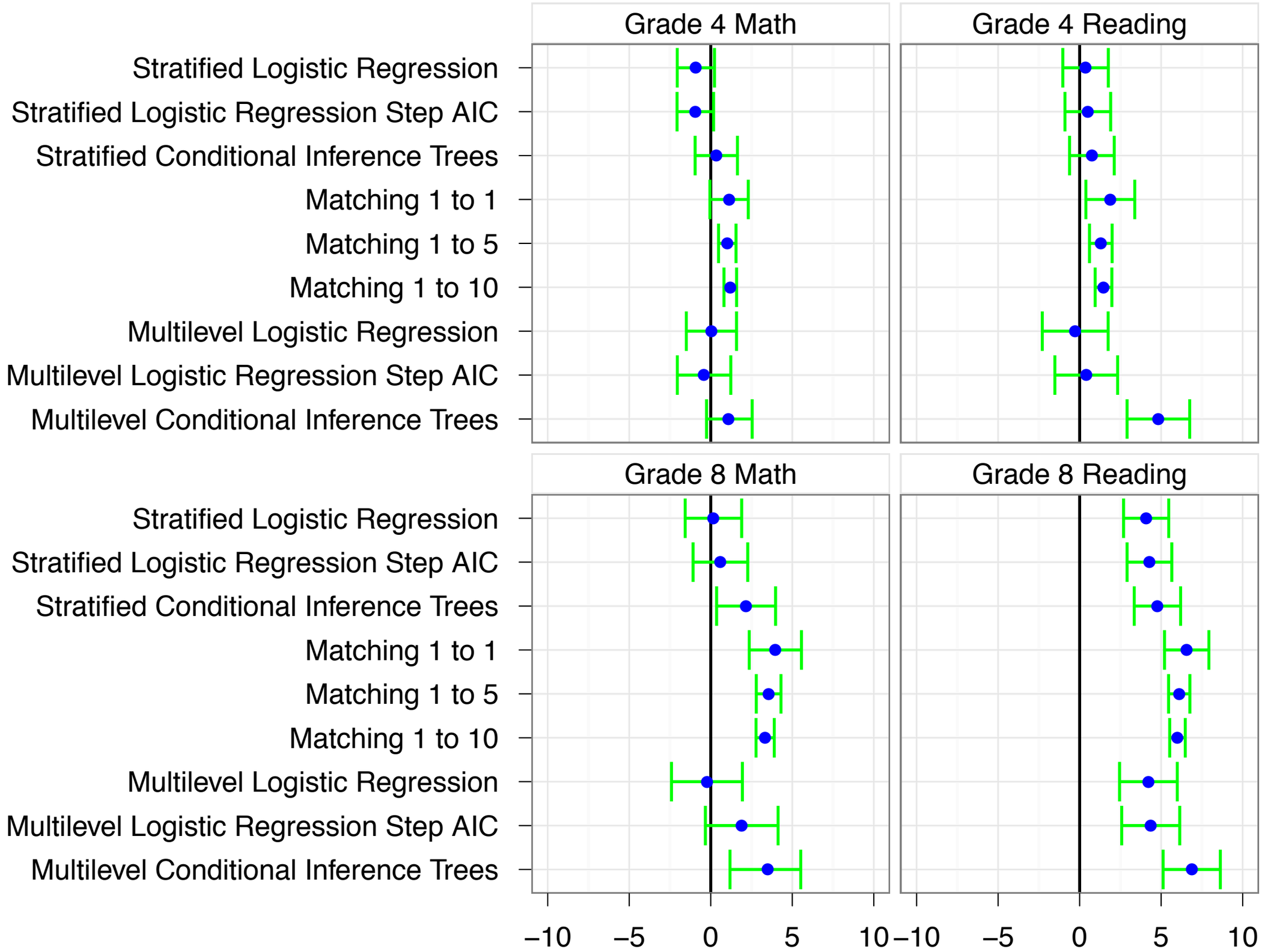

State
Rhode Island 29
Maryland 21.5
Louisiana 20.8
Dist. of Columbia 13.7
Tennessee 10.9
South Carolina 8.17
Colorado 7.04
Texas 6.73
Idaho 6.71
Illinois 6.48
California 5.75
Delaware 5.04
Utah 4.9
Kansas 3.54
North Carolina 3.13
New Mexico 3.12
Minnesota 2.84
Arizona 2.16
Arkansas 2.13
Massachusetts 2.02
Oregon 1.07
Alaska 0.683
Wisconsin 0.176
Florida -0.691
Ohio −2.71
Georgia −6.96
Hawaii −7.27
Michigan −8.24
Pennsylvania −13.9
Missouri −14.7
Indiana −29.1
New York −30.6
−40
−20
0
20
40
Difference Score (Charter – Public)


Grade 4 Math
Grade 4 Reading
Grade 8 Math
Grade 8 Reading
Stratified Logistic Regression
Stratified Logistic Regression Step AIC
Stratified Conditional Inference Trees
Matching 1 to 1
Matching 1 to 5
Matching 1 to 10
Multilevel Logistic Regression
Multilevel Logistic Regression Step AIC
Multilevel Conditional Inference Trees
−10
−5
0
5
10
Difference (charter – public)

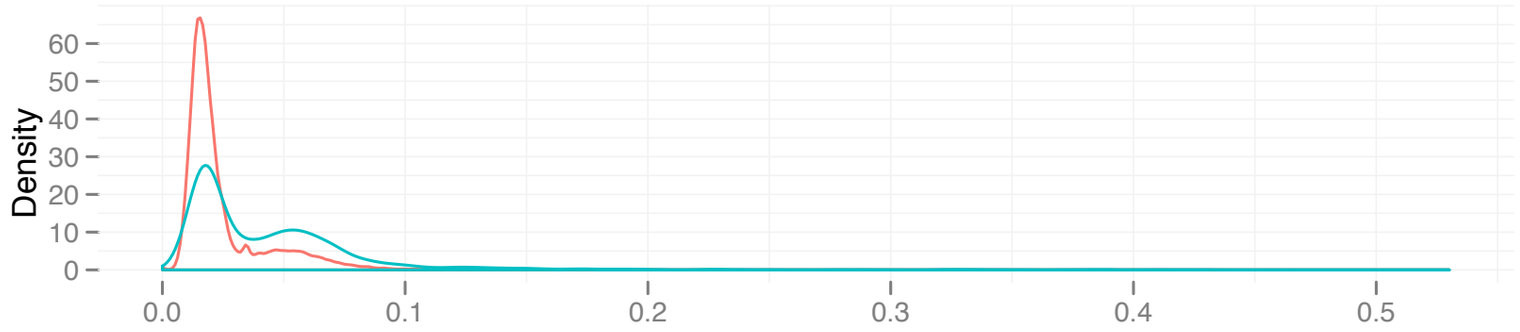
Conclusions

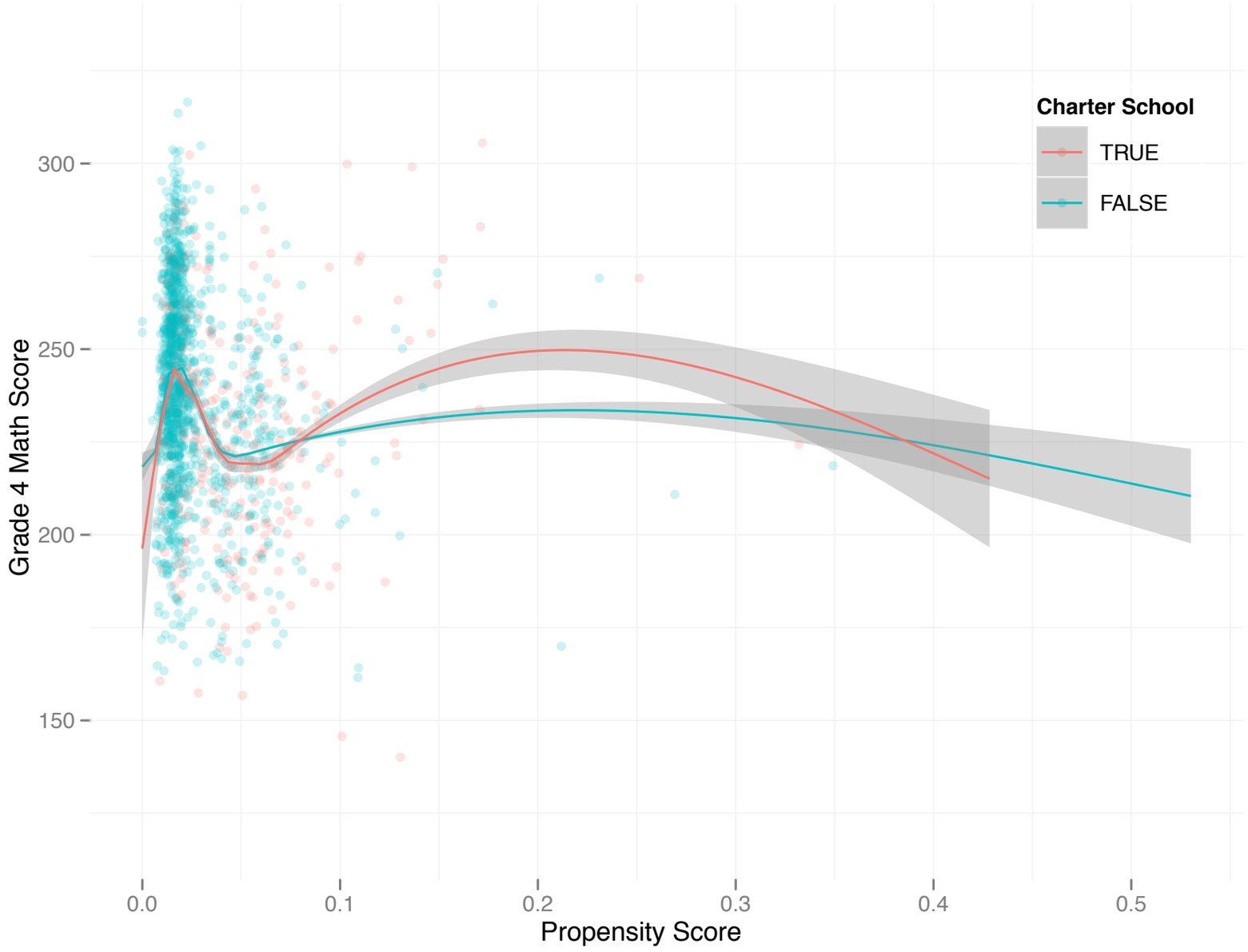
- Charter schools perform as well as traditional public schools in grade 4 reading, grade 4 math, and grade 8 math.
- Charter schools perform slightly better than traditional public schools in grade 8 reading, though the effect size is relatively small.
- There may not be many differences between charter and traditional public school students.
- Multilevel PSA performs as well as traditional clustering methods for PSA as well as matching.
- However, multilevel PSA provides insight into the differences between important clusters.

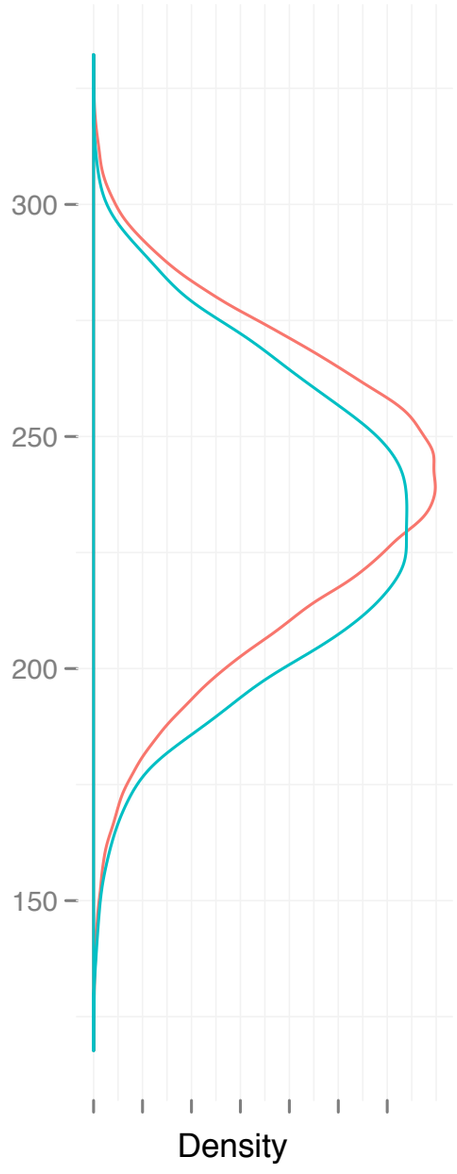
Future Directions

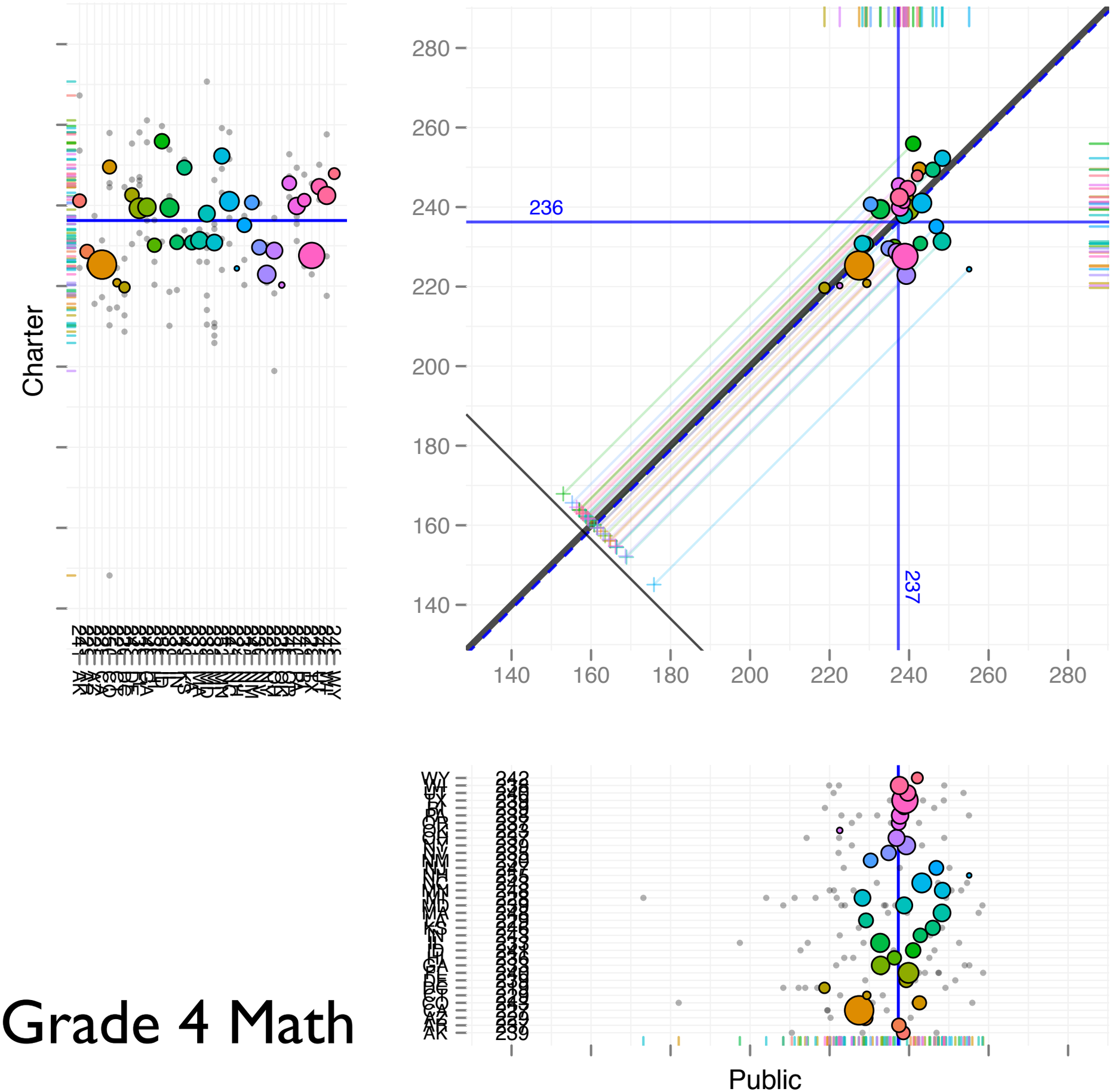
- Analysis is nearly complete for the 2009 NAEP
- The R package (multilevelPSA) will be release to CRAN. Beta version is available at http://github.com/jbryer/multilevelPSA
- Correlation between the state rankings from the multilevel PSA to the Center for Eduction Reform's charter school law rankings will be conducted (http://charterschoolresearch.com/)

2009 Grade 4 Math









2009 Grade 4 Math

Thank You

jason@bryer.org
http://jbryer.github.com