School Quality in California Under Common Core Standards

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March 16, 2017
Disclaimer

This research uses confidential data from the California Department of Education. Please do not cite or disseminate.

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305E150006 to the Regents of the University of California. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.
Empirical Strategy

**Question**  Does higher school value added as measured under Common Core standards lead to better college readiness?

**Source of Variation**  11th grade students who have taken standardized exams between the 5th and 8th grades.

**Identifying Assumption**  Conditional on prior test scores, the high school that each student attends is uncorrelated with individual students’ college readiness.
Background

- California Standards Test (CST)
  - Ended in the 2012-2013 school year.
  - Grades 2-11.
  - All students in a grade took the same English Language Arts (ELA) exam, so scores are comparable within grade.
  - Students took different math subjects starting in the 7th grade, so scores are not comparable across subjects within grade.

- Smarter Balanced Assessment Consortium (SBAC)
  - Grades 3-8 and 11.
  - Aligned with Common Core standards.
  - Computer-based adaptive exam: test questions are determined by student performance.
  - Scores are comparable within grade.
School Value Added

- A measure of a school’s *additional* input into student learning.
- How much more/less do students learn compared to the average school after accounting for each student’s incoming characteristics?
- How is school value added estimated?
  - 11th grade test scores are adjusted for student-level background characteristics, including 5th-8th grade CST scores, and school-level peer characteristics.
  - Bayesian shrinkage estimates adjust for potential noise due to small cohorts or common shocks.
Data

- 11th grade ELA test score (CST).
- 11th grade ELA and math test scores (SBAC).
- 5th-8th grade ELA and math test scores.
- Economic disadvantage, ethnicity, and gender.

<table>
<thead>
<tr>
<th>11th Grade Assessment</th>
<th>2012 &amp; 2013 11th Grade Cohort</th>
<th>2015 &amp; 2016 11th Grade Cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td>CST</td>
<td>CST</td>
<td>SBAC</td>
</tr>
<tr>
<td>CST</td>
<td>CST</td>
<td>CST</td>
</tr>
</tbody>
</table>
Relationship Between 8th and 11th Grade Test Scores

Figure: SBAC ELA School Average Test Scores

Slope = 0.854
Standard Error = 0.0152
Observations = 1549
R Squared = 0.778
Specification

- **Step 1: Estimate school value added**
  - 11th grade test score = \( f(\text{controls}) + \text{value added} \)
  - **Controls:**
    - 5th-8th grade ELA/math test scores, math scores interacted with math test FE (7-8th grade)
    - Gender FE, ethnicity FE, economic disadvantage FE, year FE
    - School-year averages: economic disadvantage, Hispanic, black, 8th grade ELA test scores, 6th grade ELA/math test scores
    - School-year RE

- **Step 2: Regress college readiness measures on school value added**
Specification

\[ z_{istc11} = \alpha + \sum_{g=5}^{8} \left[ \delta_{cg} \cdot z_{icg} + \delta_{c-g} \cdot z_{ic-g} \right] + \beta_1 X_{i11} \]

\[ + \beta_2 \cdot W_{st} + \gamma_t + \nu_{sc} + \varepsilon_{istc11} \]

\[ y_s = \alpha + \phi \cdot \nu_{sc} + \eta_s \]

\[ z_{icg} = \text{Grade } g \text{ Subject } c \text{ Test Score} \]
\[ z_{ic-g} = \text{Grade } g \text{ Opposite Subject Test Score} \]
\[ X_{i11} = \text{11th Grade Demographic Characteristics} \]
\[ W_{st} = \text{School Characteristics} \]
\[ \gamma_t = \text{Year Fixed Effects} \]
\[ \nu_{sc} = \text{School Value Added} \]
\[ y_s = \text{School-Level College Readiness Measures} \]
School Average Test Score and Value Added Distributions

(a) SBAC ELA

(b) SBAC Math

Figure: SBAC School Average and School Value Added Distributions
Value Added and Average Test Scores

(a) 8th Grade

Figure: SBAC ELA Value Added vs. School Average Test Score

(b) 11th Grade
# Advanced Placement Exams

## Background Data Methodology Results

### SBAC ELA

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<tbody>
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<td>.0282</td>
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<tr>
<td></td>
<td>(.0094)</td>
<td>(.0092)</td>
<td>(.00784)</td>
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### SBAC Math

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<tr>
<td>SBAC Math</td>
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<td>.175</td>
<td>.127</td>
<td>.127</td>
<td>.0643</td>
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<tr>
<td></td>
<td>(.00706)</td>
<td>(.00714)</td>
<td>(.00639)</td>
<td>(.00639)</td>
<td>(.00757)</td>
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</table>

### SBAC ELA Bayesian Shrinkage Estimate s.d.

- 0.233
- 0.227
- 0.173
- 0.144
- 0.172

### SBAC Math Bayesian Shrinkage Estimate s.d.

- 0.215
- 0.211
- 0.165
- 0.154
- 0.144

### First Stage Controls:

- Individual Demographics: Y Y Y Y Y
- Prior Test Score, Same Subject: Y Y Y Y Y
- Prior Test Score, Opposite Subject: - Y Y Y Y
- CST ELA Value Added: - - Y Y Y
- School-Year Level Random Effects: - - - Y -
- School-Year Level Averages: - - - - Y

### Table

Dependent Variable: # of AP 3s, 4s, and 5s per 10-12th Grade Students (2015). Weight: 11th Grade Cohorts Size.
### SAT Scores

<table>
<thead>
<tr>
<th></th>
<th>Total Average SAT Score</th>
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<tr>
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<td>45.2</td>
<td>47.1</td>
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<td>(6.22)</td>
<td>(6.06)</td>
<td>(5.08)</td>
<td>(5.08)</td>
<td>(5.18)</td>
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<td><strong>SBAC Math</strong></td>
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<td>127</td>
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<td>(4.51)</td>
<td>(4.59)</td>
<td>(3.89)</td>
<td>(3.89)</td>
<td>(4.92)</td>
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<tr>
<td>SBAC ELA Bayesian Shrinkage Estimate s.d.</td>
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<td>Individual Demographics</td>
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<tr>
<td>Prior Test Score, Same Subject</td>
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<td>Y</td>
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<tr>
<td>Prior Test Score, Opposite Subject</td>
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<td>Y</td>
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<tr>
<td>CST ELA Value Added</td>
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<td>School-Year Level Random Effects</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>Y</td>
</tr>
</tbody>
</table>

**Table:** Dependent Variable: Total Average SAT Score (2015). Weight: 11th Grade Cohorts Size.
School Value Added

- What contributes to school value added?
  - Teacher quality
  - Curriculum
  - Administration
  - Counselors
  - Culture

- What does not affect school value added?
  - Student background characteristics
  - Academic ability
  - Parental education
  - Primary language
Controlling for prior academic performance is important for estimating a school’s value added.

- School average test scores overstate school quality.

SBAC value added is significantly correlated with measures of college readiness.

- Math value added appears to have a larger impact on college readiness than ELA value added.
- A one standard deviation increase in SBAC math is associated with an increase in school average total SAT score of 12 points as a lower bound and 127 points as an upper bound.
- However, we are unable to calculate CST math value added.
Next Steps

- Investigating the relationship between school value added and individual college readiness
  - Course taking
  - A-G requirements
  - Remediation
- How does a signal of college readiness impact postsecondary education?
  - Application
  - Attendance
  - Academic performance
Thanks!

- California Department of Education
  - Jonathan Isler
  - Sean Kaviani
  - Eric Zilbert
- University of California, Davis
  - Sherrie Reed
  - John Daniels
  - K. A. Kramer

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305E150006 to the Regents of the University of California. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.