# School Quality in California Under Common Core Standards

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# Disclaimer

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 Please do not cite or disseminate.

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# 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)
  - Started in the 2014-2015 school year.
  - 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

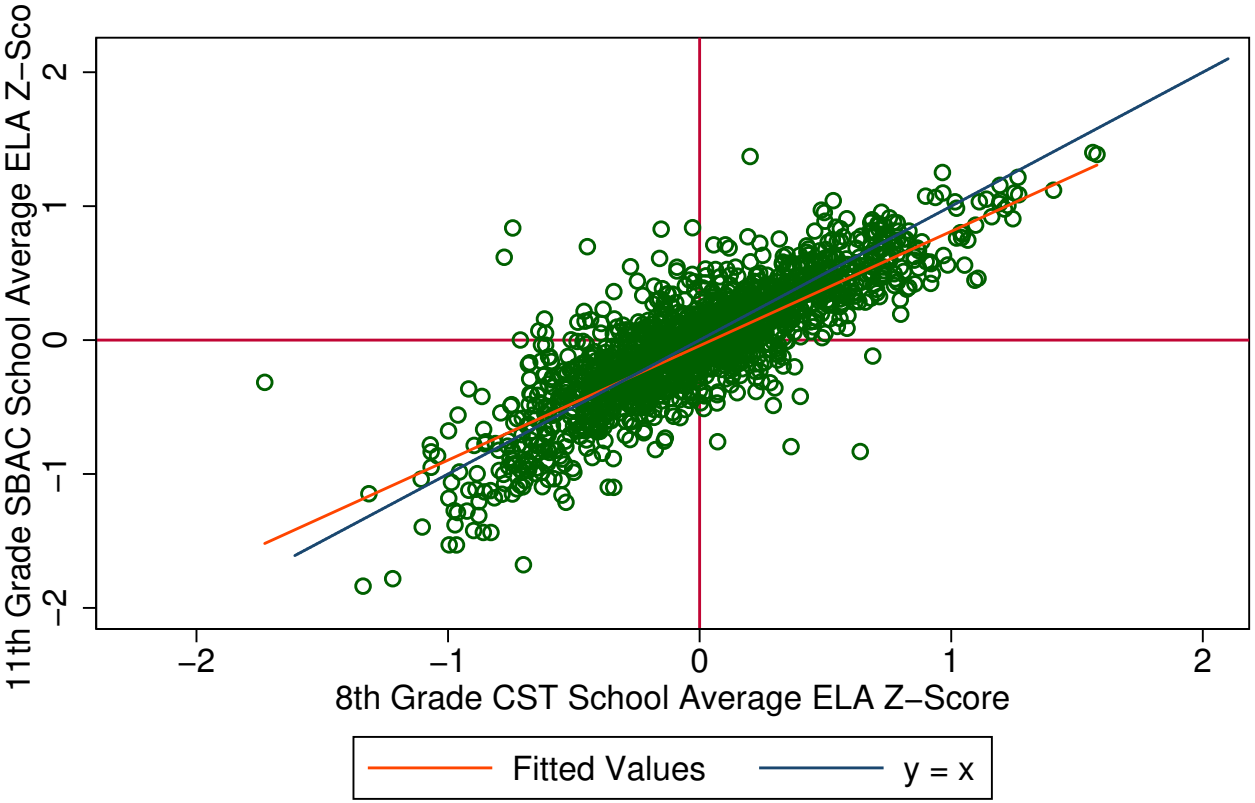
- A measure of a school's *additional* input into student learning.
- How much more/less do students learn compared to the average school after accounting for each student's incoming characteristics?
- How is school value added estimated?
  - 11th grade test scores are adjusted for student-level background 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

- 2012, 2013, 2015, and 2016 11th grade cohorts.
- 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.

| | 2012 & 2013 11th Grade Cohort | 2015 & 2016 11th Grade Cohort |
|---|---|---|
| 11th Grade Assessment | CST | SBAC |
| 8th Grade Assessment | CST | CST |

# Relationship Between 8th and 11th Grade Test Scores




Slope = .854
Standard Error = .0152
Observations = 1549
R Squared = .778

Figure: SBAC ELA School Average Test Scores

# 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

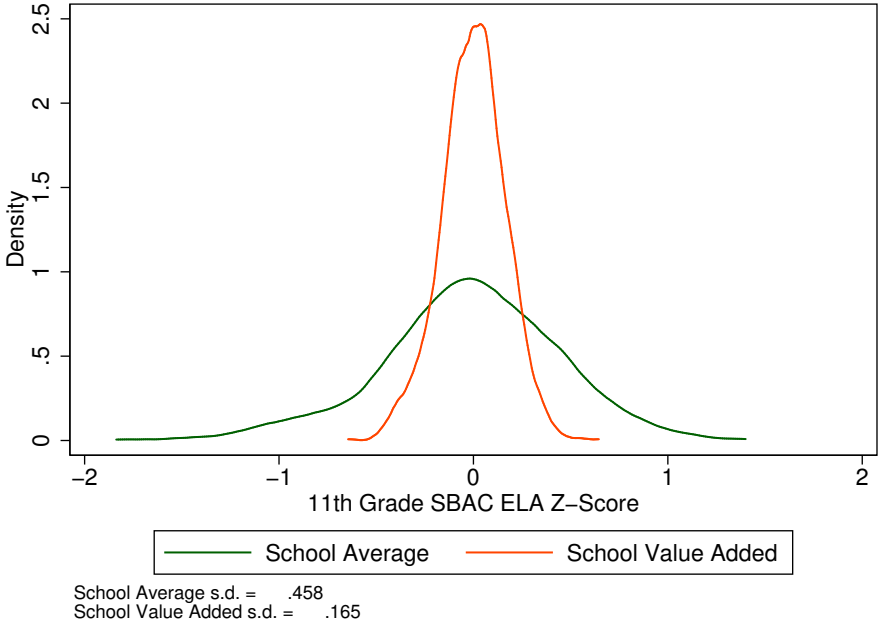
# Specification

$$z_{istc11} = \alpha + \sum_{g=5}^{8} \left[ \delta_{cg} \cdot z_{icg} + \delta_{c-g} \cdot z_{ic-g} \right] + \beta_1 X_{i11} + \beta_2 \cdot W_{st} + \gamma_t + \nu_{sc} + \varepsilon_{istc11} \quad (1)$$

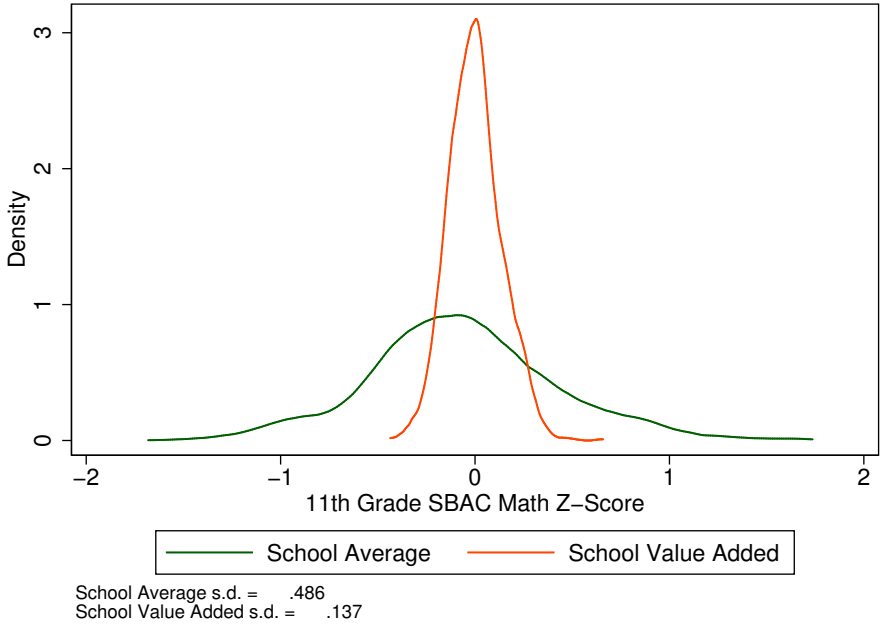
$$y_s = \alpha + \phi \cdot \nu_{sc} + \eta_s \quad (2)$$

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

# School Average Test Score and Value Added Distributions



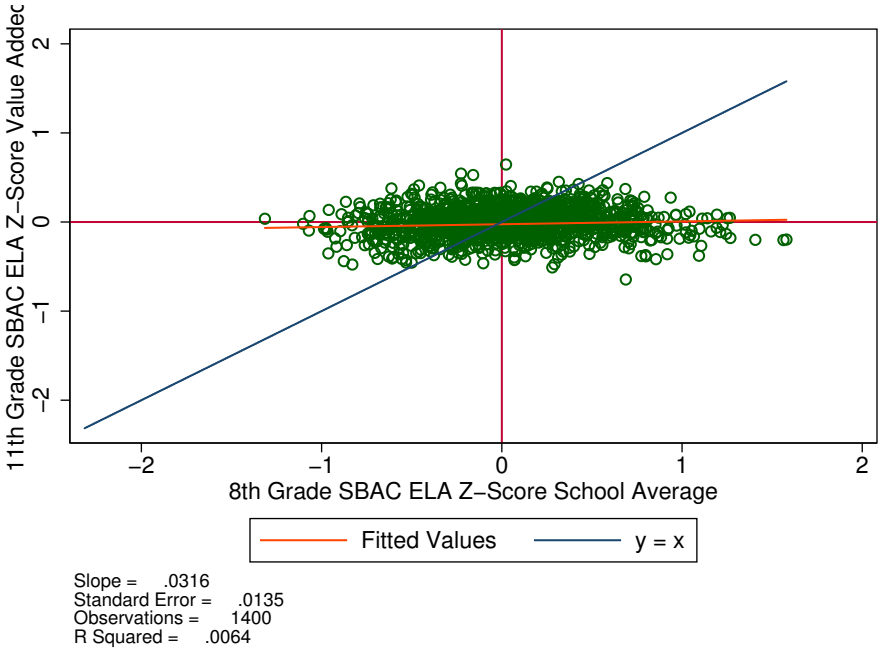

(a) SBAC ELA



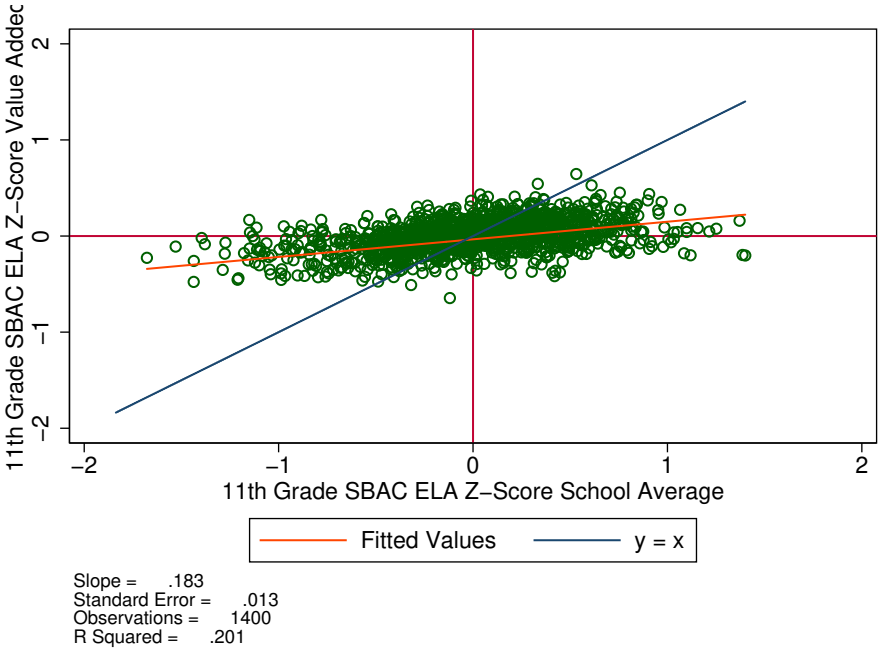

(b) SBAC Math

Figure: SBAC School Average and School Value Added Distributions

# Value Added and Average Test Scores




(a) 8th Grade




(b) 11th Grade

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

# Advanced Placement Exams

| | # of AP 3s, 4s, and 5s per 10-12th Grade Students | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| SBAC ELA | .0703*** | .0672*** | .0282*** | .0276*** | -.000459 |
| | (.0094) | (.0092) | (.00784) | (.00784) | (.00793) |
| SBAC Math | .177*** | .175*** | .127*** | .127*** | .0643*** |
| | (.00706) | (.00714) | (.00639) | (.00639) | (.00757) |
| 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

| | Total Average SAT Score | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| SBAC ELA | 45.2*** | 47.1*** | 33.6*** | 33.1*** | 15.4*** |
| | (6.22) | (6.06) | (5.08) | (5.08) | (5.18) |
| SBAC Math | 127*** | 125*** | 103*** | 103*** | 51.9*** |
| | (4.51) | (4.59) | (3.89) | (3.89) | (4.92) |
| 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: 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

# Conclusions

- 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!

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