PUBLIC POLICY INSTITUTE OF CALIFORNIA

25 YEARS

Achievement in California's Public Schools

What Do Test Scores Tell Us?

Technical Appendices

CONTENTS

Paul Warren and Julien Lafortune

Appendix A. SBAC Proficiency Levels

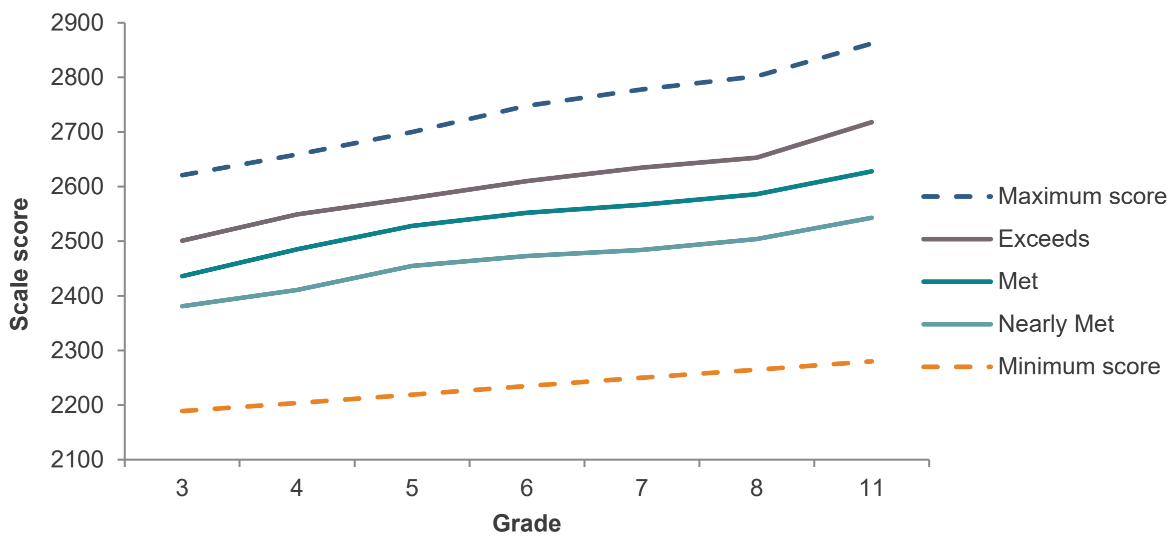
SBAC reports student scores in two ways. Student performance is first calculated as a scale score, with points earned by answering questions correctly. The scale scores are then translated into performance levels, which report student scores based on the state's goals for students. Figure A1 shows how the SBAC mathematics test translates scale scores into performance levels. The vertical axis shows the range of scale score points for the mathematics tests. The three solid lines show the minimum score needed to be included in the nearly met, met, or exceeds standard performance levels. Scores that fall below the nearly met standard level are included in the below standard level.

The maximum and minimum scores on the test are far apart—more than 400 scale points in third grade growing to almost 600 points in eleventh grade. The four performance levels fit within a rather narrow range in the middle of the distribution. In 3rd grade, the low end of the met standard level is 55 points above the minimum nearly met score. Similarly, the bottom of the exceeded standard range is 65 points above the minimum met standard score.

In addition, the SBAC scale scores are not linear—that is, students in the lower grades generally are expected to make larger gains than those in the upper grades. As a result, growth in scale scores at different grades are not comparable. In grades 3 and 4, the minimum score for the met standard level grows by more than 40 points each year. In grades 5 through 8, minimum scores of the met standard level grow between 15 and 24 scale score points.[1] The other performance levels have similar differences by grade.

FIGURE A1

Performance levels on the SBAC mathematics test are designed to increase each year



SOURCE: California Department of Education.

NOTE: SBAC = Smarter Balanced Assessment Collaborative.

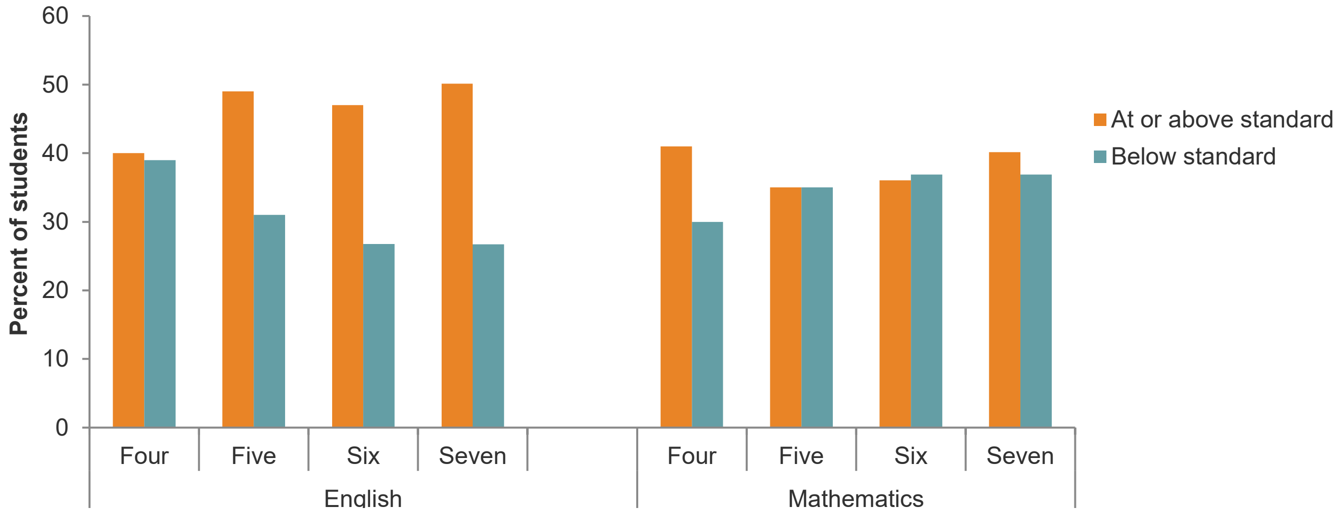
[1] The 11th grade minimum Met Standard score ticks up sharply from the 8th grade score, but three grades separate these groups.

Appendix B. Additional SBAC Results

This appendix provides supplemental information on SBAC scores to provide a broader cross-section of data on student performance in California and other states. Figures B1 and B2 display SBAC English and math scores for two additional California cohorts—students who were in fourth grade in 2015 (we report this group's scores in grades 4 through 7) and those who were in fifth grade in 2015 (we report grades five through eight).

FIGURE B1

SBAC data for the 2015 4th grade cohort

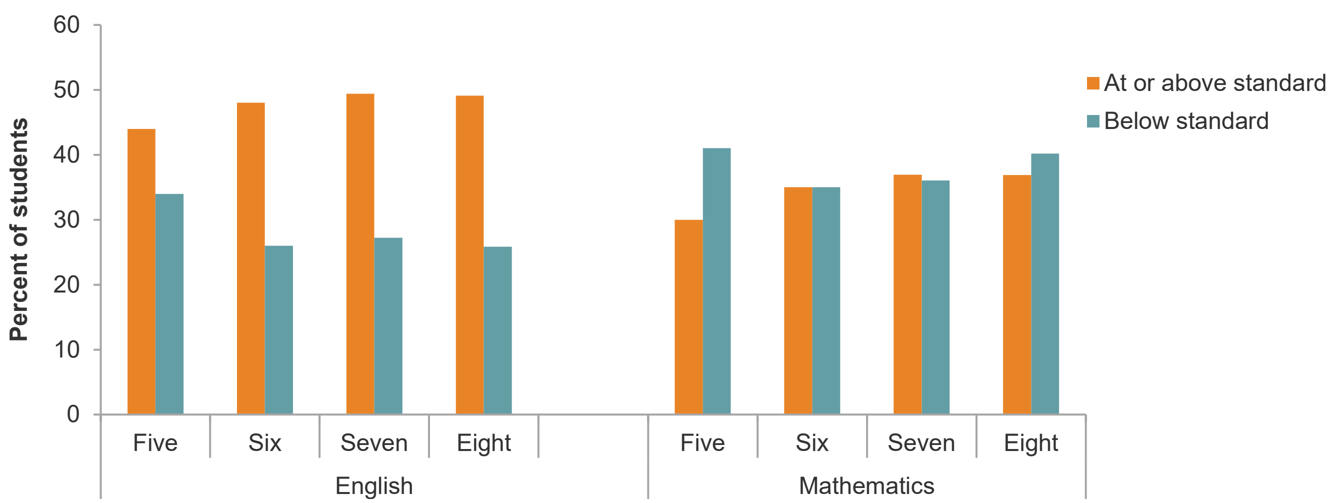


SOURCE: California Department of Education and author's calculations.

NOTES: Data represents the 2015–2018 scores for the cohort of students who were in fourth grade in 2015. At or above standard includes students scoring in the "met standard" and above standard performance levels. Not show is the proportion of students scoring in the "near standard" performance level.

FIGURE B2

SBAC data for the 2015 5th grade cohort



SOURCE: California Department of Education and author's calculations.

NOTES: Data represents the 2015–2018 scores for the cohort of students who were in fifth grade in 2015. At or above standard includes students scoring in the "met standard" and above standard performance levels. Not shown is the proportion of students scoring in the "near standard" performance level.

Appendix C. District-level Growth Estimation

Relying on aggregate test score data poses challenges when estimating growth for individual districts. Ideally, student-level longitudinal data could be used to ensure that growth measures are generated from grade-to-grade changes in test score performance for the same student or group of students. Unfortunately, we do not have access to these data, which are not widely available to researchers. Instead, we compute growth at the district level using the change in average scale scores for a given cohort within a district. Student movement between districts is a potentially important confound, and we take two main approaches to mitigate this.

First, we limit our analysis to only those districts with relatively stable demographics and enrollment during the four-year period study. We define enrollment as the total number of students with valid test scores, and we exclude districts with greater than a 25 percent increase or decrease in total enrollment over these four years. We also exclude districts that saw a change in the share of students who are economically disadvantaged by 10 percent or greater over 4-year period. Finally, districts with missing enrollment or test score data are excluded. These restrictions leave us with 552 districts in English and 546 in math, which represent just under 60 percent of districts but over 88 percent of tested students statewide.

It is worth noting that roughly half of the districts that are excluded from the growth analysis are dropped due to missing test score and/or enrollment data. Due to reporting confidentiality, CDE only releases scores for subgroups of students with at least 11 students. Thus, any district that has fewer than 11 students with valid test scores in a grade is excluded. While not many students are at such small districts, many of California's roughly 1,000 districts are quite small: for the 3rd grade cohort we study, nearly 200 districts are excluded due to non-reported data in at least one year.

Second, we report adjusted measures of growth that net out changes in the demographic composition in a given district over the four years we study. Specifically, we use linear regression to decompose growth for district d and cohort *c,* denoted $Growth_{d,c}$, into a component that is associated with demographic changes in a district, denoted $\Delta_{15-18}X'_{d,c}$, and a residual component:

$$Growth_{d,c} = \Delta_{15-18}X'_{d,c}\beta + \epsilon_{d,c}$$

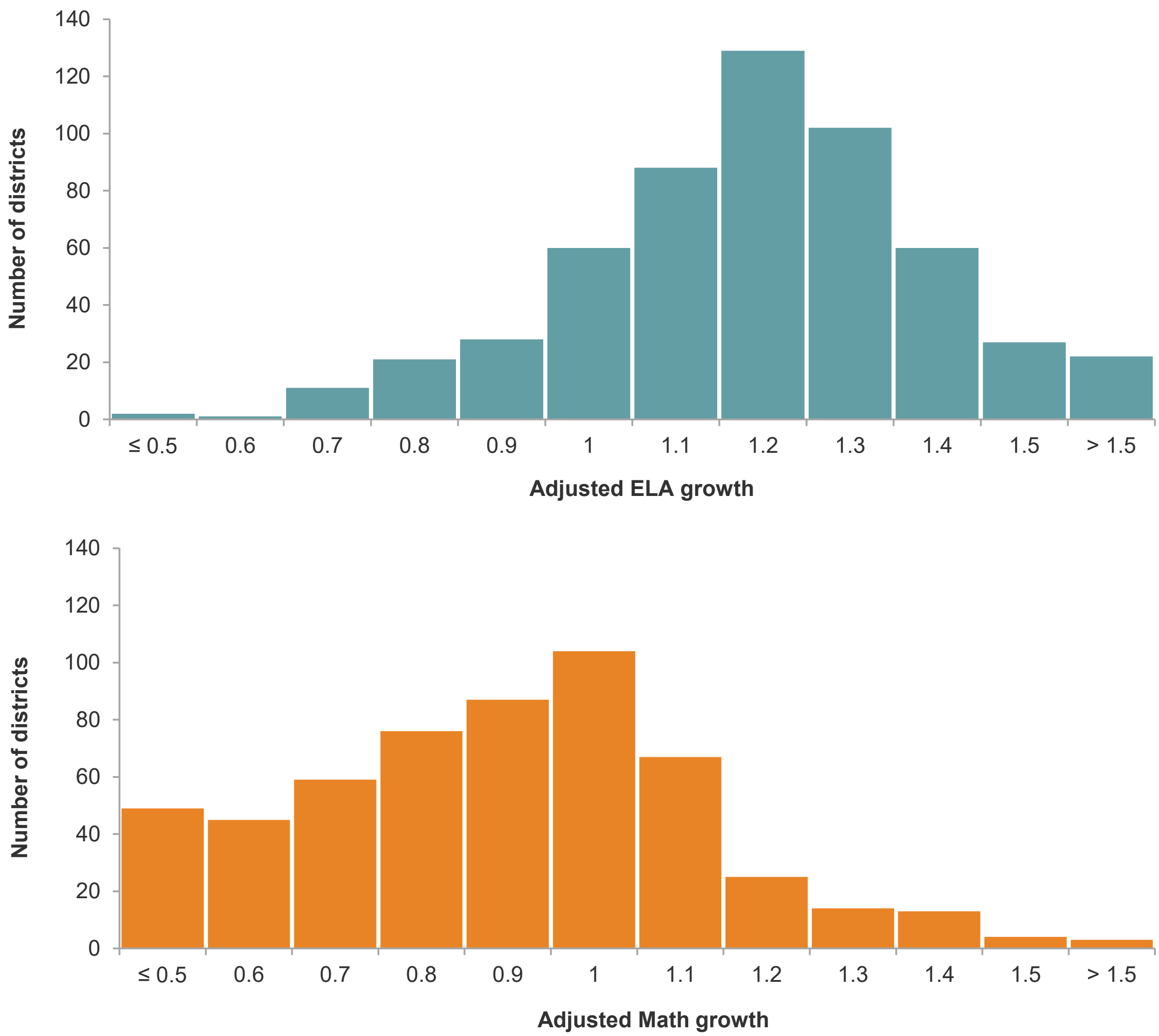
Our adjusted measure of growth is the residual from the above equation. Separate regressions are run for each cohort, and are weighted by enrollment in 2015. The matrix of demographic changes, $\Delta_{15-18}X'_{d,c}$, includes changes in total enrollment and changes in the share of enrollment in each demographic subgroup. The demographic subgroups in the public SBAC data that we use are: student economic disadvantage, racial/ethnic designation, migrant status, and parental educational background. When these demographic shares are not reported due to small cell size restrictions, we set the change to zero, and include an indicator variable equal to one for when a district-subgroup's enrollment data is missing. It is important to note that this adjusted measure does not net out differences in the overall demographic composition of districts; the adjustment only accounts for *changes* in a district's composition, *given the demographic makeup of that district in 2015*, the first year of SBAC testing.

This adjustment method comes with two important caveats. First, the adjustment only accounts for net changes in the observable demographic characteristics of a district's students. Student demographics and the socio-economic situation in a district may change in ways that affect test scores, but are unobservable in the data we use. Second, to the extent that families sort into and out of districts in response to changes in district performance, adjusting growth to account for demographic shifts could attenuate estimates of the "true" growth in district performance.

Reassuringly, these adjustments turn out to have only a small impact on district-level cohort growth estimates in practice; adjusted growth measures are highly correlated with the raw, unadjusted growth measures. For English, the correlation coefficient is 0.97, while for math it is slightly smaller but still high, at 0.90. In practice, most district-cohorts have relatively small net changes in demographic composition over the four years we study (and we exclude those that experienced much larger changes). Figures C1 and C2, show the distributions of growth measures, adjusted and unadjusted, respectively. As expected, the distributions of growth, and their relationships with district economic disadvantage, are very similar.

FIGURE C1

Distribution of district-level growth, grades 3 to 6, 2015–2018 (adjusted)

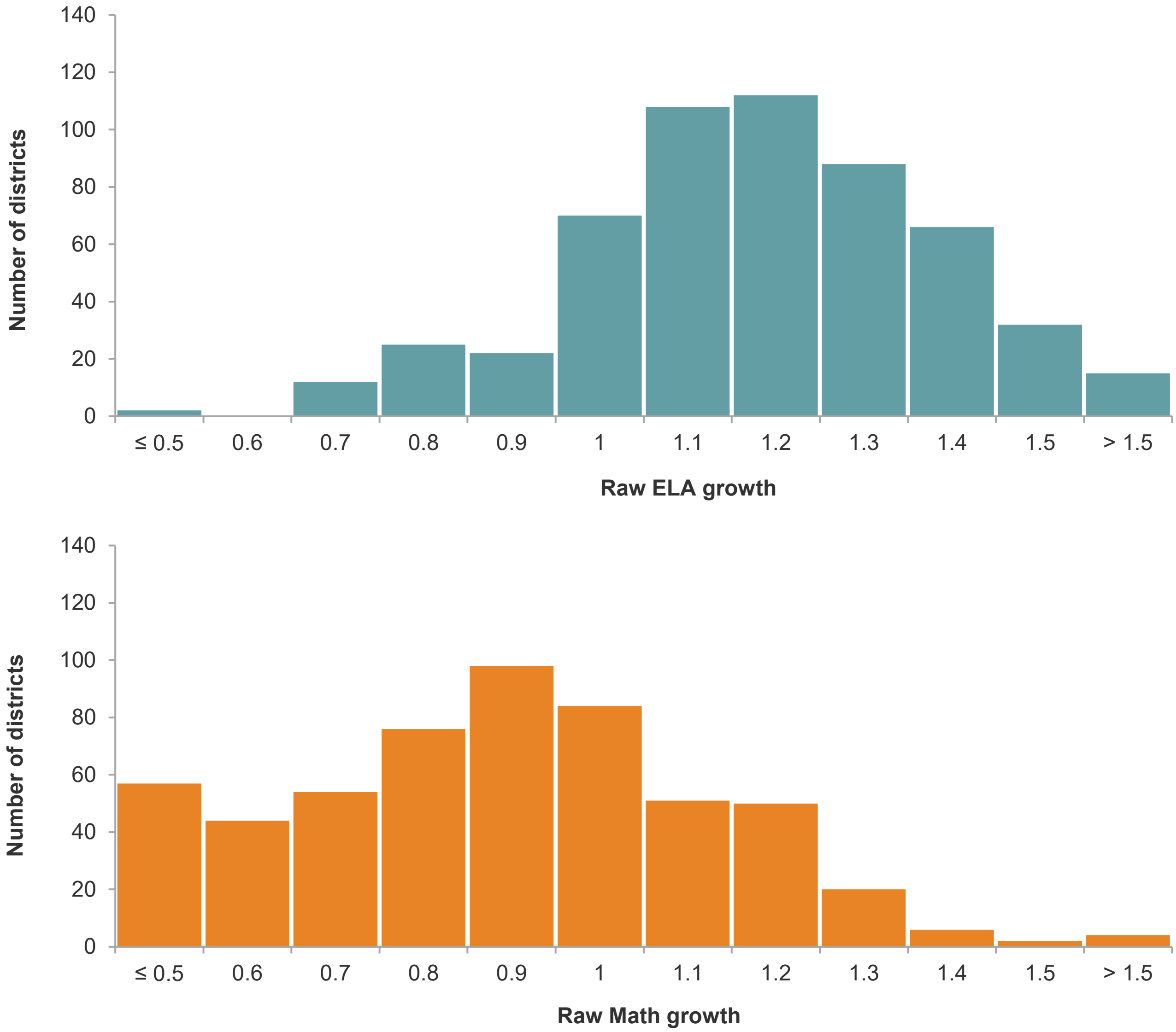


SOURCE: California Department of Education; authors' calculations.

NOTES: The top panel reports adjusted English growth and the bottom panel reports adjusted mathematics growth. Only the growth for the grade 3 to grade 6 cohort is shown. Growth is not reported for districts with large changes in enrollment, large changes in the student disadvantage, or for small districts with non-reported test scores. Each column includes districts that fall in a narrow range of growth estimates. For instance, districts in the "0.6" column have a growth estimate of between 0.5 and 0.6. Similarly, districts in the "0.7" column have a growth estimate between 0.6 and 0.7.

FIGURE C2

Distribution of district-level growth, grades 3 to 6, 2015–2018 (unadjusted)



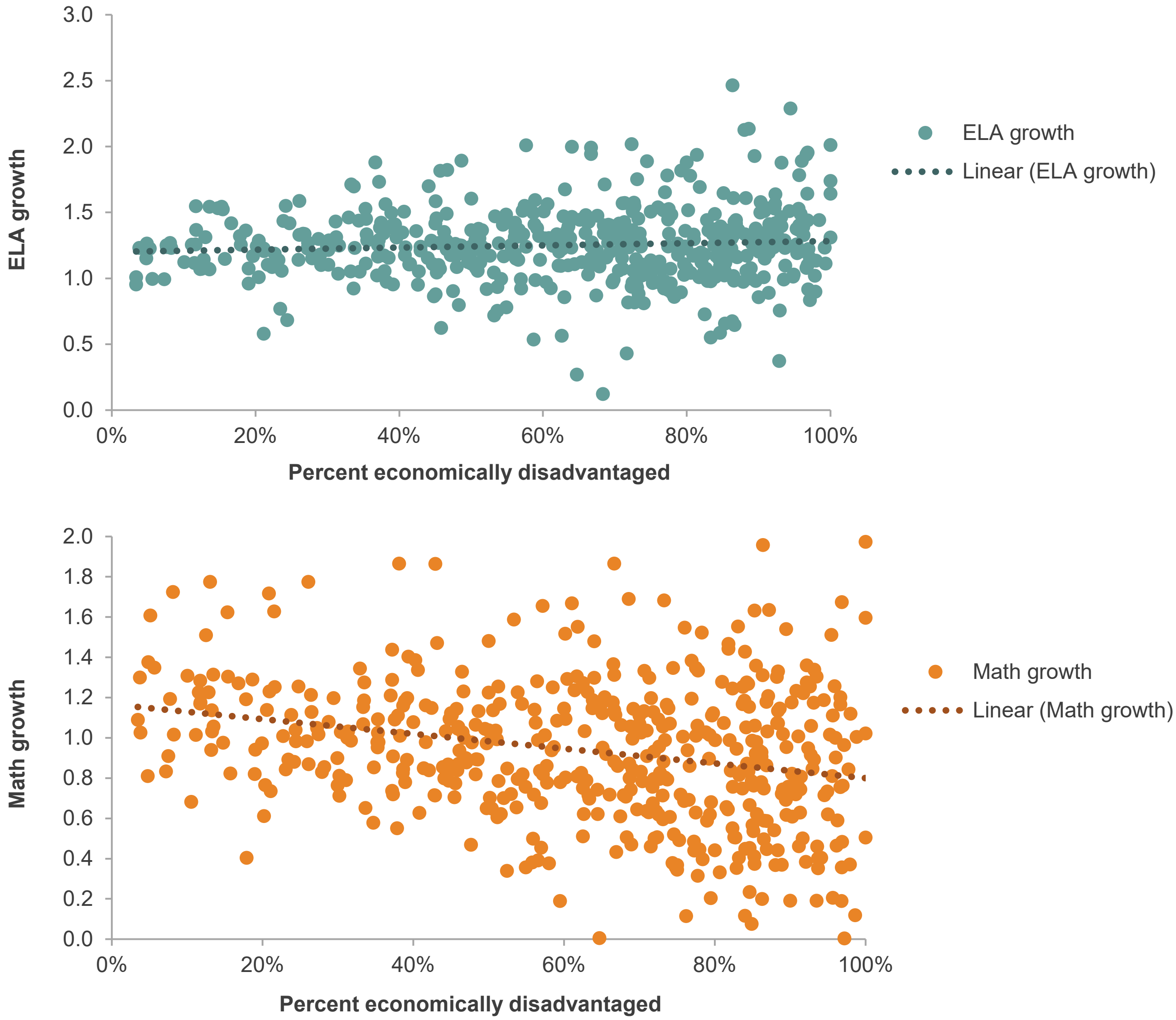
SOURCE: California Department of Education; authors' calculations.

NOTES: The top panel reports raw English and the bottom panel reports raw mathematics growth. Only the growth for the grade 3 to grade 6 cohort is shown. Growth is not reported for districts with large changes in enrollment, large changes in the student disadvantage, or for small districts with non-reported test scores. Each column includes districts that fall in a narrow range of growth estimates. For instance, districts in the "0.5" column have a growth estimate of between 0.5 and 0.6. Similarly, districts in the "0.6" column have a growth estimate between 0.6 and 0.7.

Figures C3 and C4 display the distribution of adjusted district-cohort growth estimates in English and mathematics for the 2015 fourth grade cohort and the 2015 fifth grade cohort by the proportion of socioeconomically disadvantaged students in each district.

FIGURE C3

Growth (adjusted) by district share economically disadvantaged, grades 4 to 7, 2015–2018

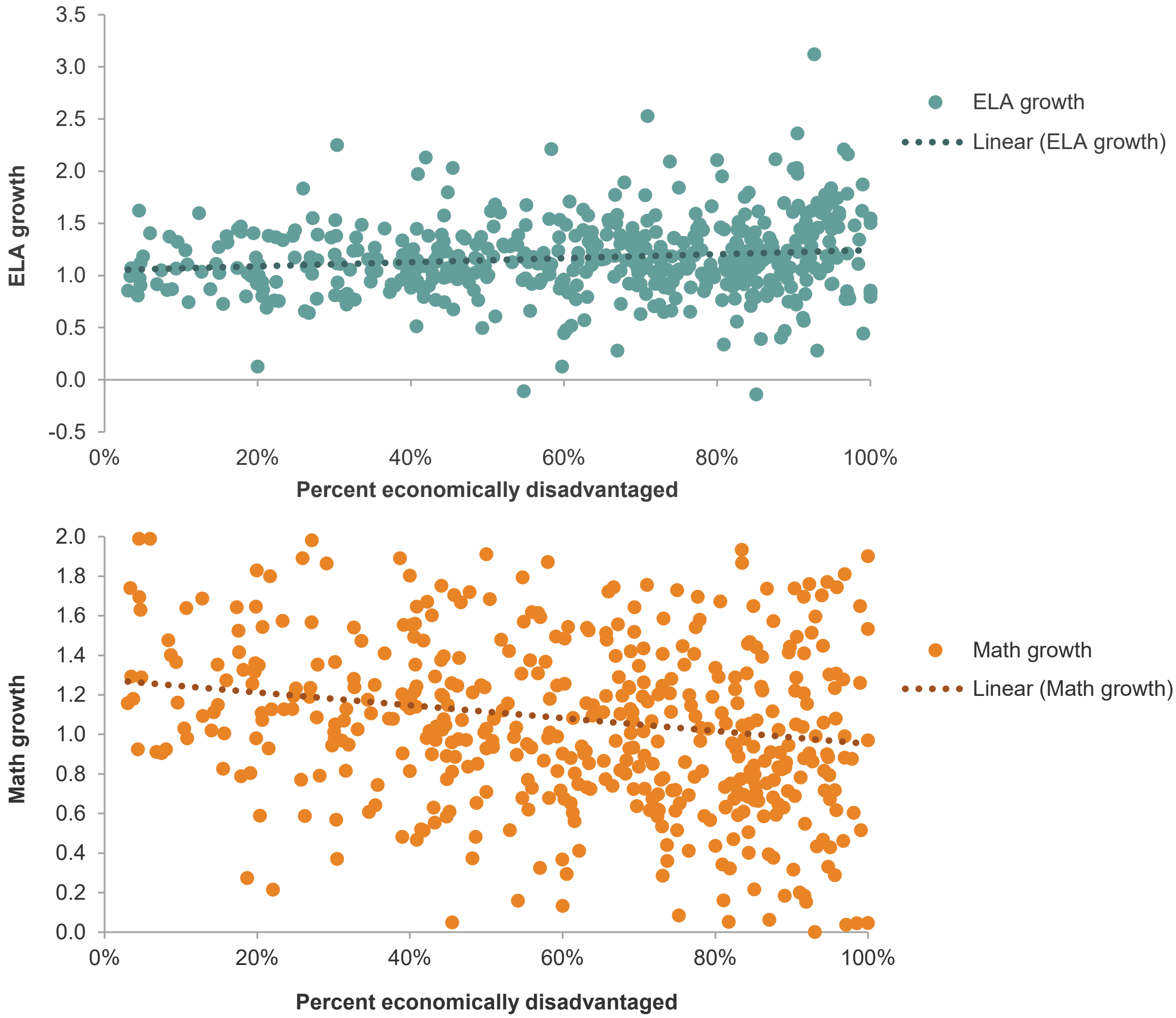


SOURCE: California Department of Education; authors' calculations.

NOTES: The top panel reports English and the bottom panel reports mathematics growth. The x-axis shows the percent of students in a district who were economically disadvantaged in 2015. Each dot represents one district. Only the growth for the grade 4 to grade 7 cohort is shown. Growth is not reported for districts with large changes in enrollment, large changes in the student disadvantage, or for small districts with non-reported test scores.

FIGURE C4

Growth (adjusted) by district share economically disadvantaged, grades 5 to 8, 2015–2018



SOURCE: California Department of Education; authors' calculations.

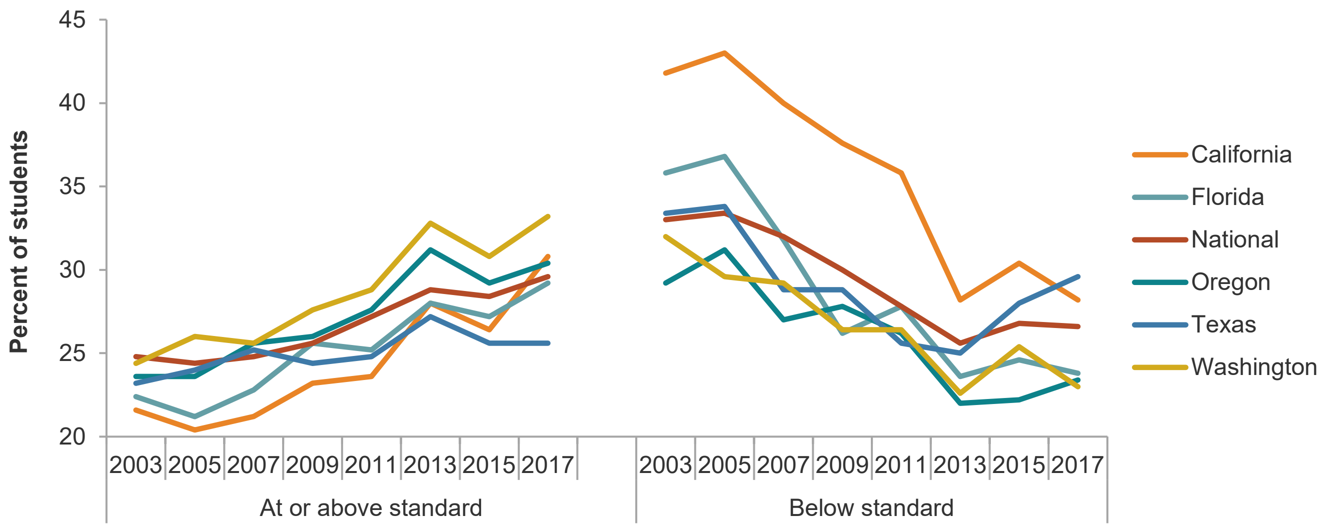
NOTES: The top panel reports English and the bottom panel reports mathematics growth. The x-axis shows the percent of students in a district who were economically disadvantaged in 2015. Each dot represents one district. Only the growth for the grade 4 to grade 7 cohort is shown. Growth is not reported for districts with large changes in enrollment, large changes in the student disadvantage, or for small districts with non-reported test scores.

Appendix D. Additional NAEP Results

This appendix provides supplemental information on 8th grade NAEP scores. Figure D1 shows 8th grade reading scores, and Figure D2 illustrates 8th grade scores in mathematics.

FIGURE D1

8th grade NAEP reading scores for selected states

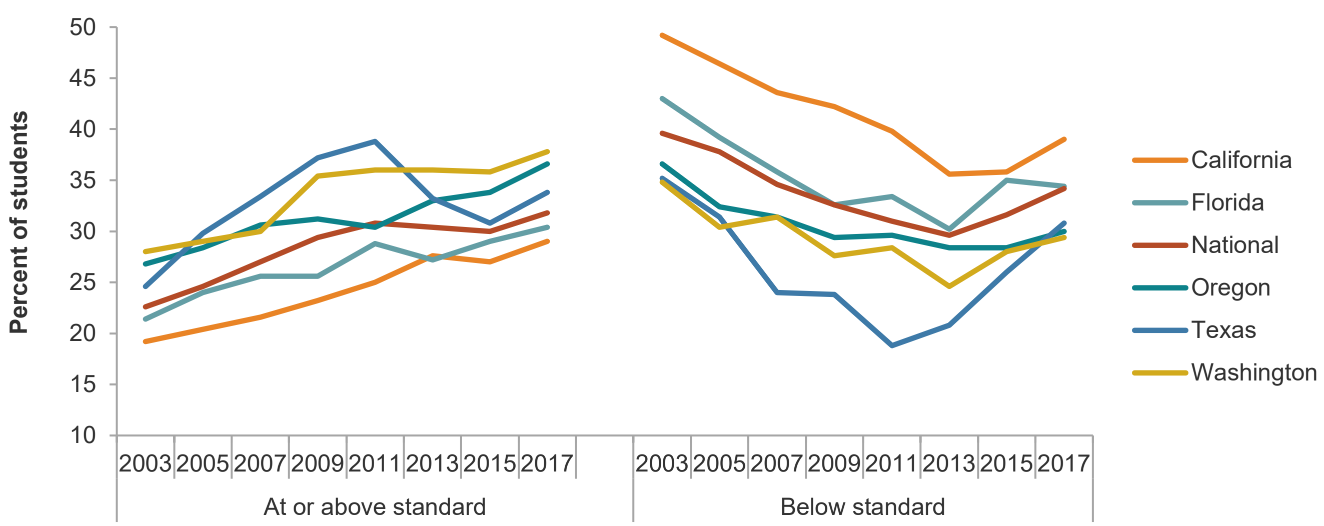


SOURCE: U.S. Department of Education and author's calculations.

NOTES: Data represent a "constant weight" score, obtained by averaging the percent of students scoring at NAEP levels for students who are eligible for free or reduced-price meals in school with those of students who are not eligible for the subsidized meals program. The figure assumes that 60 percent of students in all states qualify for the meals program and 40 percent do not—roughly California's proportions.

FIGURE D2

8th grade NAEP mathematics scores for selected states



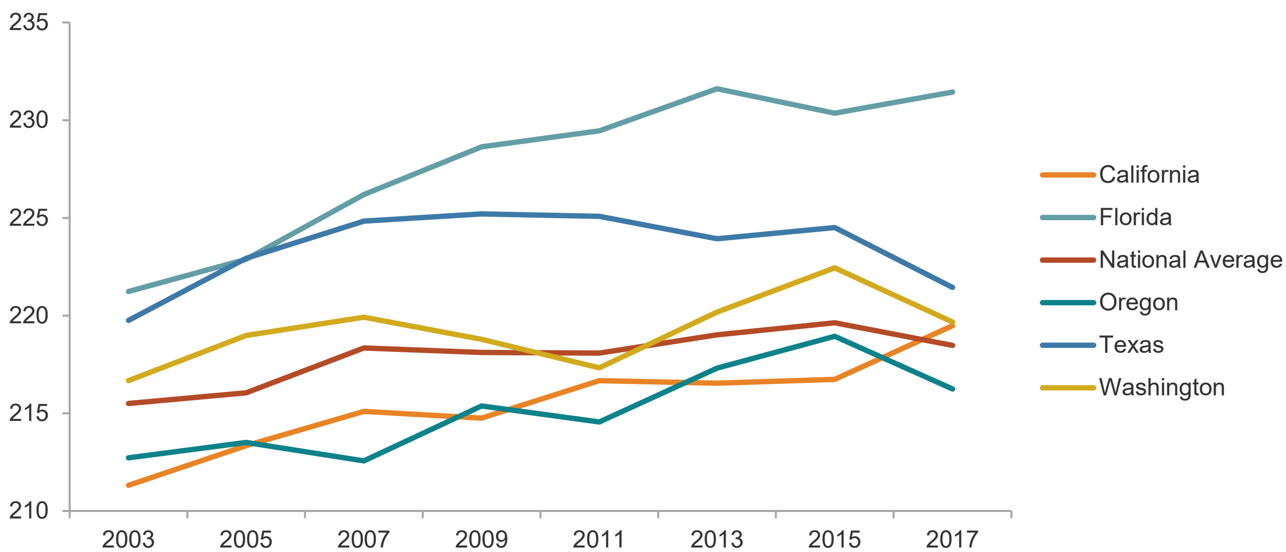
SOURCE: U.S. Department of Education and author's calculations.

NOTES: Data represent a "constant weight" score, obtained by averaging the percent of students scoring at NAEP levels for students who are eligible for free or reduced-price meals in school with those of students who are not eligible for the subsidized meals program. The figure assumes that 60 percent of students in all states qualify for the meals program and 40 percent do not—roughly California's proportions.

Figures D3 and D4 contain average NAEP state reading and mathematics scores that have been adjusted to reflect the demographic makeup of students in each state. These data are adjusted by the Urban Institute, and are adjusted to make state comparisons less subject to differences in each state's student body. In these figures, we used a data series that adjust for family income (based on student eligibility for the federal meals program), English learner status, language spoken at home, and student age.

FIGURE D3

Average state and national NAEP 4th grade reading scores adjusted for student demographics

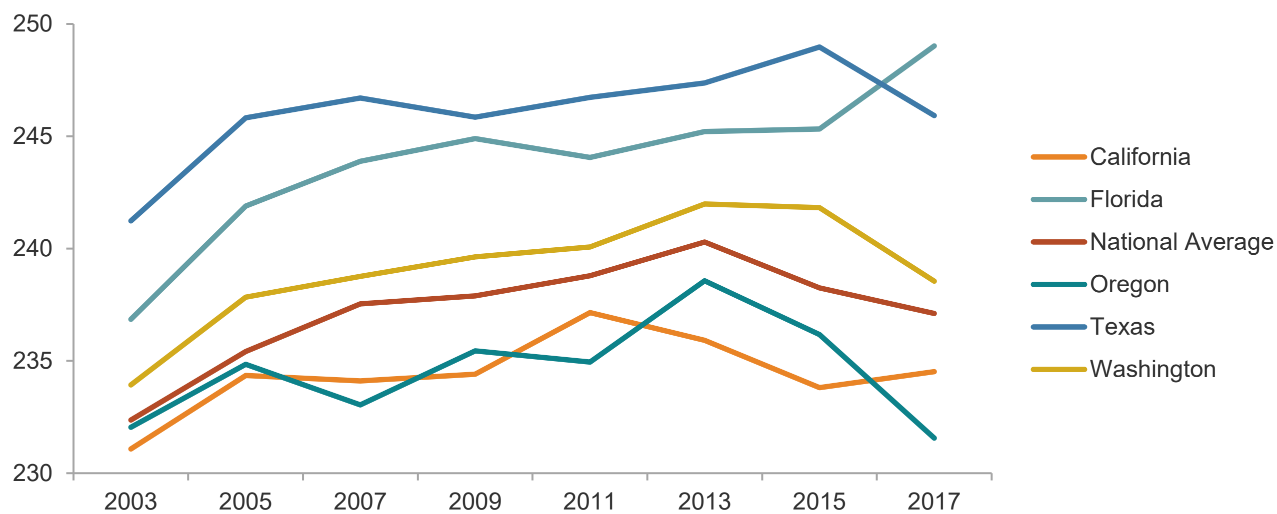


SOURCE: Urban Institute, America's Gradebook: How Does Your State Stack Up?

NOTE: Data represent average scale scores adjusted for eligibility for the federal meals program, English learner status, language spoken at home, and age. The data for the national average represents the unweighted average of the 50 state scores.

FIGURE D4

Average state and national NAEP 4th grade mathematics scores adjusted for student demographics



SOURCE: Urban Institute, America's Gradebook: How Does Your State Stack Up?

NOTE: Data represent average scale scores adjusted for eligibility for the federal meals program, English learner status, language spoken at home, and age. The data for the national average represents the unweighted average of the 50 state scores.

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Public Policy Institute of California
500 Washington Street, Suite 600
San Francisco, CA 94111
T: 415.291.4400
F: 415.291.4401
PPIC.ORG

PPIC Sacramento Center
Senator Office Building
1121 L Street, Suite 801
Sacramento, CA 95814
T: 916.440.1120
F: 916.440.1121