# Supplemental Appendix for "The Democratic Deficit in U.S. Education Governance"

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# SUPPLEMENTAL APPENDIX

## Descriptive Statistics

Table A.1: Descriptive statistics of analytic samples

| | SEDA District Universe | Analytic Sample |
|---|---|---|
| *California* | | |
| No. of Districts | 973 | 811 |
| Mean Student Enrollment | 2897 | 3619 |
| Urban | 15.9% | 18.9% |
| Rural | 42% | 33.7% |
| White | 45.2% | 40% |
| Special Ed | 11.9% | 11.7% |
| English Learners | 17.1% | 18.7% |
| *Illinois* | | |
| No. of Districts | 873 | 641 |
| Mean Student Enrollment | 1055 | 1069 |
| Urban | 4.7% | 3.9% |
| Rural | 40.9% | 41.6% |
| White | 77.8% | 78.3% |
| Special Ed | 16.2% | 16.1% |
| English Learners | 4% | 4.2% |
| *Ohio* | | |
| No. of Districts | 617 | 562 |
| Mean Student Enrollment | 1275 | 1257 |
| Urban | 3.7% | 3.6% |
| Rural | 46.5% | 45.4% |
| White | 89.5% | 89.4% |
| Special Ed | 14.4% | 14.4% |
| English Learners | 1% | 1% |
| *Oklahoma* | | |
| No. of Districts | 537 | 386 |
| Mean Student Enrollment | 537 | 578 |
| Urban | 1.5% | 1.6% |
| Rural | 78.6% | 77.8% |
| White | 59.7% | 61.1% |
| Special Ed | 15.2% | 14.7% |
| English Learners | 2.6% | 2.4% |

## Voter Migration

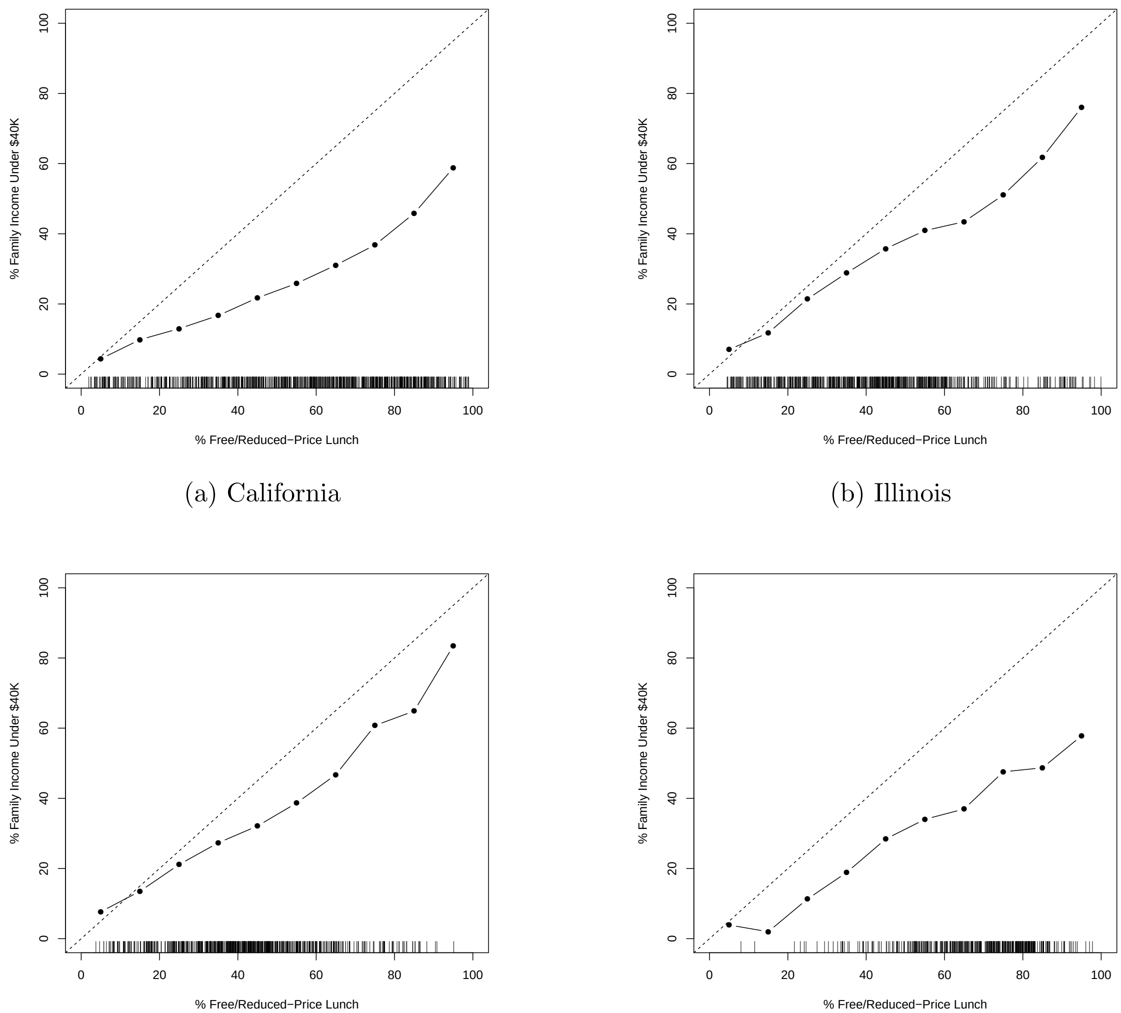
Our compositional measures are based on the current snapshot of the Catalist voter file. Unlike the official voter file, Catalist records are not "purged" as individuals become inactive or die, so the records should be complete for all elections held since 2008. However, the firm does update voter addresses as individuals change residences. Thus, a voter we observe today living in one school district may have lived in a different school district at the time of an earlier election. Since we have access only to current addresses, we match voters to their current jurisdictions.

Several published studies and one working paper examine the consequences of this kind of migration and show that it is unlikely to affect our estimates. For example, one study compares partisanship of voters based on current addresses with official 2008 presidential results and finds that they are correlated at $r > 0.9$ (Kogan, Lavertu and Peskowitz 2018). Another study compares the total vote count based on the 2016 Catalist snapshots and historical vote counts in Ohio school levy elections and finds that the two are correlated at $r = 0.98$ (Cook et al. 2020). A similar analysis comparing current Catalist voter counts with official California elections results over the same time period as our analysis reports a correlation of $r = 0.999$ (Hajnal, Kogan and Markarian 2020).

## Voter Income

To examine disparities in socioeconomic status, we compare the share of students who qualify for free or reduced-priced lunch (FRPL) with the share of voters with family income under $40,000, the approximate income cutoff for reduced-price lunch eligibility for a family of typical size during the period we examine.[1] Admittedly, existing research suggests that FRPL status is an imperfect proxy for student family income, so some caution is warranted in drawing inferences from this comparison (Domina et al. 2018). Overall, however, the figures suggest that voters are typically wealthier than the student population, and that this gap is largest for the most economically disadvantaged districts. Interestingly, the disparities in socioeconomic status appear to be considerably smaller than the racial differences we document in our main analysis.

[1] Unfortunately, we are limited by the relatively broad income bands used in the Catalist data, so we cannot identify FRPL eligibility more precisely.




(a) California

(b) Illinois

(c) Ohio

(d) Oklahoma

Figure A.1: The electorate in school board elections is typically wealthier than the students attending local public schools.

## White-Black Achievement Gaps

Table A.2: White-Black achievement gaps by state

| | White-Black Achievement Gap (SDs) | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *California* | | | | | | |
| Representational Gap | 0.002 | 0.005*** | 0.005** | 0.004*** | 0.004** | 0.005*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Demographic Controls | N | Y | Y | N | Y | Y |
| Commute Zone FEs | N | N | Y | N | N | Y |
| Precision Weights | N | N | N | Y | Y | Y |
| Districts | 190 | 190 | 190 | 190 | 190 | 190 |
| $R^2$ | 0.010 | 0.167 | 0.287 | 0.036 | 0.176 | 0.395 |
| Adjusted $R^2$ | 0.005 | 0.140 | 0.221 | 0.031 | 0.149 | 0.339 |
| *Illinois* | | | | | | |
| Representational Gap | 0.0005 | 0.005* | 0.005* | 0.002 | 0.012*** | 0.010*** |
| | (0.002) | (0.002) | (0.003) | (0.002) | (0.003) | (0.004) |
| Demographic Controls | N | Y | Y | N | Y | Y |
| Commute Zone FEs | N | N | Y | N | N | Y |
| Precision Weights | N | N | N | Y | Y | Y |
| Districts | 82 | 82 | 82 | 82 | 82 | |
| $R^2$ | 0.001 | 0.282 | 0.360 | 0.009 | 0.272 | 0.375 |
| Adjusted $R^2$ | −0.012 | 0.224 | 0.164 | −0.003 | 0.213 | 0.183 |
| *Ohio* | | | | | | |
| Representational Gap | 0.001 | 0.003 | 0.0003 | 0.001 | −0.0004 | −0.004 |
| | (0.002) | (0.003) | (0.003) | (0.002) | (0.003) | (0.004) |
| Demographic Controls | N | Y | Y | N | Y | Y |
| Commute Zone FEs | N | N | Y | N | N | Y |
| Precision Weights | N | N | N | Y | Y | Y |
| Districts | 101 | 101 | 101 | 101 | 101 | 101 |
| $R^2$ | 0.004 | 0.387 | 0.521 | 0.002 | 0.358 | 0.521 |
| Adjusted $R^2$ | −0.006 | 0.348 | 0.423 | −0.008 | 0.317 | 0.423 |

$^{*}p < .1$; $^{**}p < .05$; $^{***}p < .01$

Note: Dem. controls include % FRPL, % white student enrollment, and district type (urban, suburban, town, or rural).

## Adjusting for Measurement Error in Catalist's Race Predictions

Our analysis relies on the voter race predictions created by Catalist. A recent study by Bernard Fraga compares Catalist's predictions with voter self-reports for respondents in the 2010 Cooperative Congressional Election Study. Overall, he finds that the Catalist predictions correctly identify 99% of white respondents, 97% of black respondents, and 80% of Latinos, for an overall accuracy of 91% (Fraga 2016). This is similar to the numbers in a validation study conducted by Catalist using official records from southern states that ask voters to identify their race on the voter registration forms. The Catalist study showed that predicted race matched the officially recorded race 90% of the time for white voters, 86% of the time for black voters, and 83% of the time for Latino voters.

Even with this relatively high predictive accuracy, one may worry that the residual measurement error may be correlated with student demographics in a way that biases our analyses and makes the representational gap look larger than it really is. For example, in overwhelmingly nonwhite districts, it is likely that there are more nonwhite voters who are misclassified as being white than there are white voters who are misclassified as minorities, exaggerating the extent to which nonwhite voters are under-represented in our data for these districts.

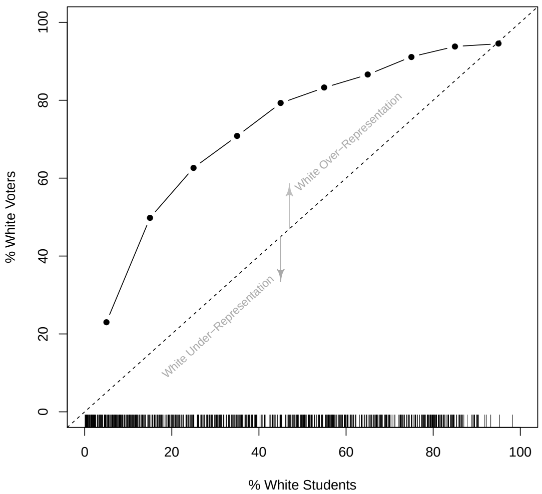
Ideally, we would adjust the Catalist estimates for these misclassifications directly. Unfortunately, we do not have all of the necessary parameters to implement such adjustments with precision. For example, although we know the percent of white voters who are correctly classified as white, we do not know what percent of those who are misclassified are mistakenly labeled as Black vs. Latino vs. Asian. Instead, we proceed with the most conservative assumptions possible—to ensure that our corrections, if anything, under-estimate the true share of the electorate that is white.

First, we assume that that minority voters may be misclassified as being white, but that no white voters are incorrectly flagged as nonwhite. Second, we use the information provided in the Catalist technical documentation (which is more conservative than Fraga's estimates) to back out the number of minority voters incorrectly predicted to be white and subtract them from our numerator.

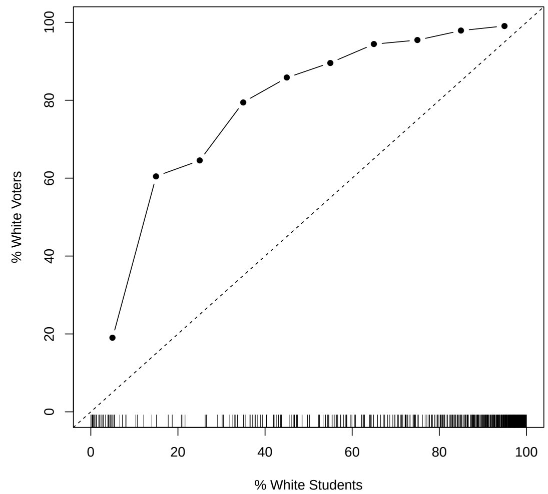
Consider the following example. Suppose we observe a school district with 200 voters, 116 of whom are coded as white in the Catalist data and 84 of whom are coded as Black. Using the uncorrected Catalist data, we would calculate that the white share of the electorate is 58 percent (116 white voters ÷ 200 voters total). To implement our correction, we assume that all 84 Black voters are correctly classified (in fact, it is likely that this number includes some white voters incorrectly classified as Black). Second, we use the Catalist validation records, which show an 84 percent correct classification rate among Black voters, and assume that the remaining 16 percent of Black voters are all incorrectly classified as being white (in fact, some may instead be misclassified as members of another minority subgroup). In our simple example, this implies that 16 voters coded as white in the Catalist data are actually Black, so we manually subtract 16 from our white total and add it to our Black total. Using this procedure, our corrected data would now show that the white share of the electorate is only 50 percent (100 white voters ÷ 200 voters total).

We should stress, as we note above, that this is is a very conservative approach. It almost certainly provides a *lower bound* for the white share of the electorate. If we find that white voters are still over-represented even after implementing this correction, we can be confident that the true representational gap is at least as large as what we find with the corrected data, and is probably even larger.

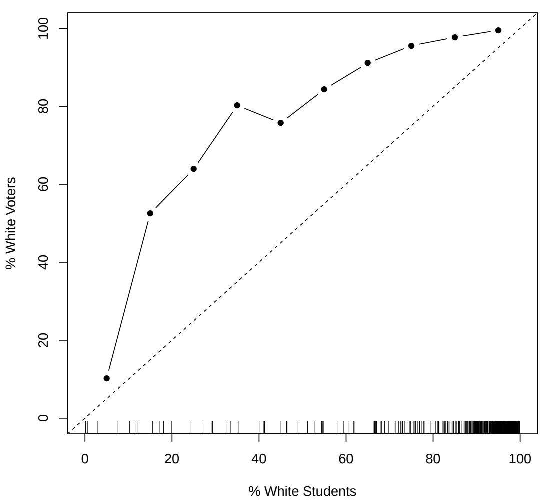
The tables and figures below replicate all of our analyses after implementing this conservative procedure to adjust for misclassification in the Catalist predictions of voter race. Overall, the corrections do not change any of our key results. We still find: (1) white voters are over-represented in school board elections, relative to the student populations; (2) most majority-nonwhite school districts have majority white electorates; and (3) the achievement gaps between white and nonwhite students tend to be larger in districts where voters look most dissimilar from the student population.



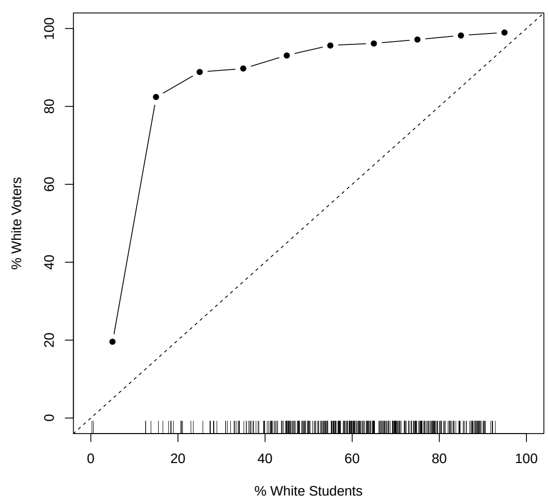

(a) California




(b) Illinois




(c) Ohio




(d) Oklahoma

Figure A.2: Racial composition of school board electorate vs. students after correcting for potential misclassification in the Catalist data

Table A.3: Most majority-nonwhite school districts have majority-white electorates even after correcting Catalist data for potential miclassification of voter race

| | California | Illinois | Ohio | Oklahoma |
|---|---|---|---|---|
| **Majority Nonwhite Districts** | 439 | 90 | 28 | 106 |
| **(% of all districts)** | (58.9%) | (15.9%) | (5%) | (27.4%) |
| Average White Voter Share | 51% | 52.5% | 57.9% | 89.5% |
| White Voter Majority | 58.9% | 61.1% | 71.4% | 98.1% |

Table A.4: Hispanic students most underperform whites in districts with least representative electorates, correcting for potential miclassification of voter race in Catalist data

| | White-Hispanic Achievement Gap (SDs) | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *California* | | | | | | |
| Representational Gap | $0.004^{***}$ | $0.007^{***}$ | $0.006^{***}$ | $0.004^{***}$ | $0.007^{***}$ | $0.006^{***}$ |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Demographic Controls | N | Y | Y | N | Y | Y |
| Commute Zone FEs | N | N | Y | N | N | Y |
| Precision Weights | N | N | N | Y | Y | Y |
| Districts | 419 | 419 | 419 | 419 | 419 | |
| $R^2$ | 0.031 | 0.326 | 0.424 | 0.034 | 0.338 | 0.453 |
| Adjusted $R^2$ | 0.029 | 0.316 | 0.391 | 0.031 | 0.328 | 0.422 |
| *Illinois* | | | | | | |
| Representational Gap | 0.002 | $0.011^{***}$ | $0.010^{***}$ | $0.003^{*}$ | $0.018^{***}$ | $0.018^{***}$ |
| | (0.001) | (0.002) | (0.002) | (0.002) | (0.003) | (0.003) |
| Demographic Controls | N | Y | Y | N | Y | Y |
| Commute Zone FEs | N | N | Y | N | N | Y |
| Precision Weights | N | N | N | Y | Y | Y |
| Districts | 145 | 145 | 145 | 145 | 145 | |
| $R^2$ | 0.008 | 0.396 | 0.454 | 0.025 | 0.445 | 0.478 |
| Adjusted $R^2$ | 0.002 | 0.370 | 0.376 | 0.018 | 0.420 | 0.404 |
| *Oklahoma* | | | | | | |
| Representational Gap | 0.001 | 0.004 | 0.006 | $0.003^{**}$ | $0.008^{***}$ | $0.007^{**}$ |
| | (0.001) | (0.004) | (0.005) | (0.001) | (0.003) | (0.003) |
| Demographic Controls | N | Y | Y | N | Y | Y |
| Commute Zone FEs | N | N | Y | N | N | Y |
| Precision Weights | N | N | N | Y | Y | Y |
| Districts | 45 | 45 | 45 | 45 | 45 | |
| $R^2$ | 0.006 | 0.218 | 0.459 | 0.140 | 0.685 | 0.842 |
| Adjusted $R^2$ | −0.017 | 0.094 | 0.048 | 0.120 | 0.635 | 0.721 |

$^{*}p < .1$; $^{**}p < .05$; $^{***}p < .01$

Note: Dem. controls include % FRPL, % white student enrollment, and district type (urban, suburban, town, or rural).

Table A.5: White-Black achievement gaps by state, correcting for potential miclassification of voter race in Catalist data

| | White-Black Achievement Gap (SDs) | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *California* | | | | | | |
| Representational Gap | 0.002 | 0.004*** | 0.004** | 0.004*** | 0.004** | 0.004*** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) |
| Demographic Controls | N | Y | Y | N | Y | Y |
| Commute Zone FEs | N | N | Y | N | N | Y |
| Precision Weights | N | N | N | Y | Y | Y |
| Districts | 190 | 190 | 190 | 190 | 190 | |
| $R^2$ | 0.012 | 0.167 | 0.286 | 0.040 | 0.178 | 0.396 |
| Adjusted $R^2$ | 0.007 | 0.140 | 0.220 | 0.035 | 0.151 | 0.341 |
| *Illinois* | | | | | | |
| Representational Gap | 0.001 | 0.005** | 0.005* | 0.002 | 0.010*** | 0.009*** |
| | (0.002) | (0.002) | (0.003) | (0.002) | (0.003) | (0.003) |
| Demographic Controls | N | Y | Y | N | Y | Y |
| Commute Zone FEs | N | N | Y | N | N | Y |
| Precision Weights | N | N | N | Y | Y | Y |
| Districts | 81 | 81 | 81 | 81 | 81 | |
| $R^2$ | 0.006 | 0.282 | 0.361 | 0.019 | 0.273 | 0.375 |
| Adjusted $R^2$ | −0.006 | 0.224 | 0.162 | 0.006 | 0.214 | 0.181 |
| *Ohio* | | | | | | |
| Representational Gap | 0.001 | 0.003 | 0.0003 | 0.001 | −0.0003 | −0.003 |
| | (0.002) | (0.003) | (0.003) | (0.002) | (0.003) | (0.003) |
| Demographic Controls | N | Y | Y | N | Y | Y |
| Commute Zone FEs | N | N | Y | N | N | Y |
| Precision Weights | N | N | N | Y | Y | Y |
| Districts | 101 | 101 | 101 | 101 | 101 | |
| $R^2$ | 0.004 | 0.388 | 0.521 | 0.001 | 0.358 | 0.521 |
| Adjusted $R^2$ | −0.006 | 0.348 | 0.423 | −0.009 | 0.317 | 0.423 |

*p < .1; **p < .05; ***p < .01

Note: Dem. controls include % FRPL, % white student enrollment, and district type (urban, suburban, town, or rural).

## Actual vs. Eligible Voters

One of our main contributions is to document and quantify the demographic disconnect between the voters who elect school boards and the students public schools educate. We do not, however, offer evidence on the underlying causes of this disconnect in the manuscript. This question deserves more careful treatment than we can offer here, although we provide some initial data that we hope can inform future research.

It is useful to separate possible explanations for the disparities we find into two broad categories. First, the population of adults who are actually eligible to vote may look different than the composition of enrolled students. For example, lower rates of citizenship among Latinos prevent a substantial fraction of Latino adults from voting (Highton and Burris 2002). White families are also twice as likely to enroll their children in private schools (Reardon and Yun 2002), suggesting that a larger fraction of white school-age children will not show up among the local public school student body. Although quite distinct, both of these processes would result in an eligible voter population that is whiter than the students. Other demographic factors—including variation in the ratio of children to adults per household and differences in the age distribution among racial and ethnic groups—could similarly make the *potential electorate* look whiter than the public school student population.

Second, the disparities may be at least partly a function of differences in political participation among racial and ethnic groups. An extensive body of research documents that nonwhite voters are less likely to turn out and examines the extent to which these gaps are driven by socioeconomic status, differences in political socialization, and other factors. Importantly, gaps in political participation among eligible voters are at least theoretically amenable to improvement via institutional reforms. For example, on-cycle elections have been shown to increase turnout disproportionately among nonwhite and disadvantaged voters (Kogan, Lavertu and Peskowitz 2018, Hajnal, Kogan and Markarian 2020). Similarly, research has found that minority voters have more success electing candidates of choice when local governments use by-district rather than at-large elections (Abott and Magazinnik 2020, Marschall, Ruhil and Shah 2010, Trounstine and Valdini 2008), especially when the minority population is sufficiently large and geographically concentrated.[2]

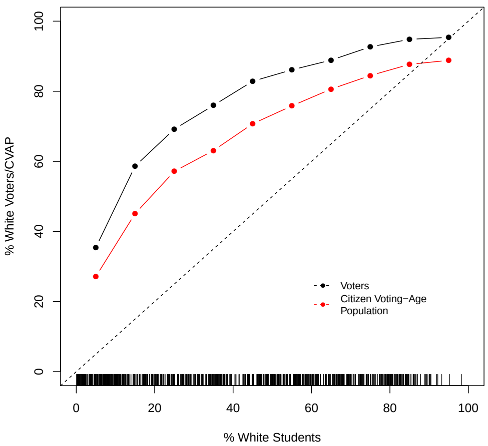
To disentangle these two sets of mechanism, Figure A.3 adds information on the racial and ethnic composition of the eligible electorate, which we measure as the citizen voting-age population (CVAP) in each school district.[3] Any difference between the dashed 45-degree line and the red CVAP binned scatter plot in each graph is the result of white voters being over-represented among the subset of the adult population that is eligible to vote. The remaining gaps between the black and red scatter plots are driven by unequal rates of participation in school board elections *among* eligible voters.

The figure reveals that lower rates of voter eligibility and lower turnout conditional on eligibility both contribute to the shortfalls we document—but also that the former mechanism is more important than the latter in most cases.[4] In other words, even in the unlikely scenario that political participation among all eligible voters could be equalized, the local electorate would continue to considerably whiter than the public student population in most communities. While reforms to political institutions may help close some of the gap in electoral participation on the margins, these findings suggest that such reforms are unlikely to fundamentally change the dynamics of school board elections or the incentives

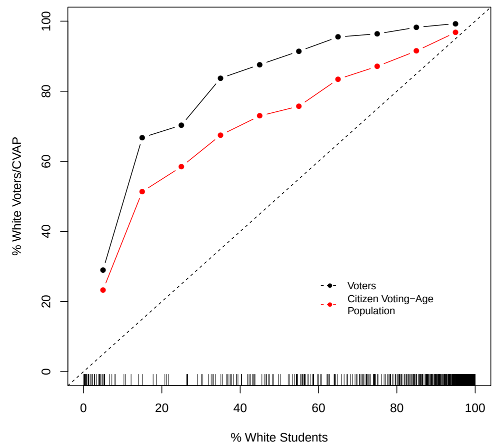
[2] Erie, Kogan and MacKenzie (2011) describe one mechanism that contributes to this finding: By limiting political competition to specific neighborhoods, district elections largely offset differences in average participation rates across neighborhoods. This reduces the number of votes necessary to prevail in a low-turnout district relative to a high-turnout district and increases the political influence of areas likely to be disadvantaged due to lower turnout in at-large elections.

[3] We rely on data from the 2010 Census and the 2008-2012 American Community Survey to construct these estimates.

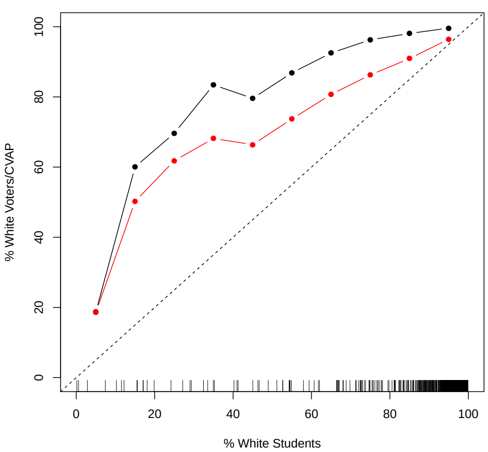
[4] In Oklahoma, the two mechanism appear to contribute roughly equally to the observed participation gap.



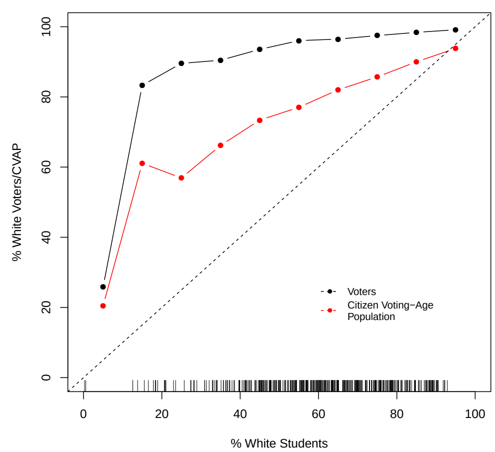

(a) California




(b) Illinois




(c) Ohio




(d) Oklahoma

Figure A.3: Comparison of student enrollment to eligible (citizen voting-age) and actual voters.

facing school board members.

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