2019

The Impact of Adequate Funding and Expenditures on Public Education and Standardized Test Scores: A Case Study

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ECON 480: Senior Seminar in Economics

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Fall 2018

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1 Introduction

In this paper, I examine the relationship between public school spending and standardized test scores. Most research conducted on this topic compares school spending with standardized test scores. However, Jackson, Johnson, and Persico's research conducted on school finance reform changes and its effect on long-run adult outcomes concludes that test scores are "imperfect measures of learning" and addresses that limitation by looking at "long-run outcomes" of adult success rates, like educational attainment.[1] Nevertheless, I have chosen to continue the comparison of school spending against test scores. The key factor behind this decision is the fact that test scores offer a benchmark, while high school graduation rates do not. High school graduation rates are still an important factor to consider when assessing the quality of public schools. When applying for our first jobs, we know that employers ask to see our diploma, not our standardized testing scores. This indicates that obtaining a diploma is a critical factor when assessing future successes. However, there is no benchmark for obtaining a degree, unlike the national scores to compare our test scores. An adequate analysis of public school spending requires a variable with a benchmark, so standardized testing scores are an appropriate choice. For my California case study, I use the Standardized Testing and Reporting (STAR) tests to gauge academic achievement.

This topic is quite relevant as many public schools in America are underfunded and struggle to provide adequate education for their students. We know that education is a key component of economic growth. According to data from the National Center for Education Statistics (NCES), enrollment in public K-12 schools nationwide in the year 2000 accounts for

[1] Jackson, C. Kirabo, Rucker C. Johnson, and Claudia Persico. "The Effects Of School Spending On Educational And Economic Outcomes: Evidence From School Finance Reforms." *The Quarterly Journal of Economics* 131, no. 1 (February 1, 2016): 157-218. doi:https://doi.org/10.1093/qje/qjv036.

47,204,000 students out of 53,373,000 total enrolled students, which is over 88% of students.[2] The NCES projected that enrollment in 2018 would be 51,880,000 out of 52,098,000 students, or 99.58% of students. The majority of our future workforce are enrolled in public schools. And yet, there is evidence that many public schools do not have adequate resources at their disposal to provide quality education for the next generation. According to data provided by CollegeBoard, the distributor of the SAT, the national average score was 1060 out of 1600 points in 2017. The lowest score by state was 950, while the highest was 1295.[3] This range in test scores indicates that some public schools are more adequately funded than others, leading to better preparation and higher test scores for better funded schools. Arguably, school finance reforms are a common way to address these inadequacies. In 1994, Michigan, a state with 628 public schools in the 1994-1995 school year, began a statewide overhaul of its school financing.[4] Research conducted on this finance overhaul concludes that equalizing spending across school districts results in an increase in test scores in districts that transitioned from lower to high spending.[5] It is concerning that the next generation may attend schools that have low spending and low test scores, while another district will have higher spending and higher test scores because of an inequitable allocation of funds.

The question I am asking is, “Does well funded public education that incurs constructive expenditures contribute positively to high standardized test scores?” I argue that well funded

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[2] "Projections of Education Statistics to 2021." National Center for Education Statistics (NCES) Home Page, a Part of the U.S. Department of Education. Accessed September 26, 2018. https://nces.ed.gov/programs/projections/projections2021/tables/table_01.asp?referrer=list.

[3] "SAT Suite of Assessments Annual Report." 2017. https://reports.collegeboard.org/pdf/2017-total-group-sat-suite-assessments-annual-report.pdf.

[4] "Number of Public School Districts in Michigan." Accessed October 01, 2018. https://www.michigan.gov/mde/0,4615,7-140-6605-36877--,00.html.

[5] Roy, Joydeep. "Impact of School Finance Reform on Resource Equalization and Academic Performance: Evidence from Michigan." *SSRN Electronic Journal*, October 2003. doi:10.2139/ssrn.630121.

public education with constructive expenditures does contribute positively to standardized test scores. I will be using the Oakland Unified School District (OUSD) in Oakland, California as a case study of a school system suffering from inadequate public education over the period 1997 - 2004. This timeframe is relevant given the financial reform that California experienced from 1999 until 2003. I conduct an empirical analysis based on earlier empirical research undertaken by Coburn and Riley (2000), Roy (2003) and Jackson, Johnson, and Persico (2016) to examine how district income, ethnicity, school spending, and finance reforms impact test scores. Ultimately, I assess how changes in district public education funding and spending contribute to an increase in standardized test scores.

First, I examine research conducted on school district funding, expenditures, minority students, and financial reforms. Then, I explain my model, data, and method of analysis for my case study. I summarize and interpret my data in relation to my hypothesis. Finally, I present a few potential avenues of future research related to this topic.

2 Literature Review

In the upcoming literature review, I examine research conducted on the topics of funding, spending, minority students, and financial reforms. Each of these topics are related, especially to financial reforms, but most importantly to student achievement. I first introduce the concepts of public education funding and spending. Then, I review the relationship between minority students and intra-district inequality. Finally, I review school finance reforms and the impact that they have on resources and students' academic achievement.

Funding

Funding for public education is typically considered to be the funds available per pupil. In most states, the majority of local property taxes are allocated to the support of public schools. A notable body of literature illustrates that the quality of public schools is tied to local property values. Voters who do not enroll their children in public schools often oppose increases in property taxes, as they do not personally reap the benefits of increased property taxes, and subsequently higher public school funding. Recently, however, the funding for public education has shifted from utilizing local property taxes to state and federal sources. Because of this, there is typically a loss of local control in the use of such funds and increased state and federal regulations on public schooling. Local funding does not only have the potential to impact student performance, but it also creates a sense of community responsibility for its schools. This motivates schools to deliver a quality education, as demanded by the community. There is also a widespread belief that an increase in per-pupil funding will not positively benefit student performance. The standard for judging student performance is the SAT, distributed by the CollegeBoard. However, a better measure of judging student performance is the National Assessment of Educational Progress (NAEP), which is not biased by student participation. Mackenzie's regression to test the relationship between academic performance and per-pupil funding found that there is a positive relationship between funding and student performance. However, a more detailed regression shows that local, not federal or state funding per pupil, has a strong positive correlation with NAEP performance.[6] Mackenzie's research shows that higher spending can lead to better student performances, but under certain conditions. When using the

[6] Mackenzie, John. "Public School Funding and Performance." 2006. https://www1.udel.edu/johnmack/research/school_funding.pdf.

SAT to gauge student performance, there is a positive relationship between higher funding and performance. However, it is more accurately measured when using a test that does not account for student participation and tracks purely academic performance. This is because the SAT, while strongly recommended, is an optional exam whereas federally administered exams are mandatory. There are other factors that can impact one's ability to take the SAT, such as the payment required to take it. Also, the claim that the NAEP, which is supported federally, is more effective than the SAT, a test that is supported at the local or state level, signals a bias. Using a federally supported exam to judge student performance is more beneficial than using local resources to judge student performance, as federal exams can account for variables that may affect local exams, such as participation. We can see that local funding has a strong relationship with federal examinations, as shown by the strong positive correlation between local funding and NAEP performance.

Hoxby researched the performance of public schools in the United States. She consistently found evidence that both students and taxpayers benefit from local systems of school funding and control. Hoxby uses the New Hampshire system of public schools, where funding is derived from local property tax revenue, as an example of one of the most stable methods of financing public schools. She found that local funding provides incentives for residents and school personnel to promote good and efficient schools, that a local property tax system will reflect the high value people place on public education, and that the local property tax system provides greater fairness in the distribution of the tax burden than a statewide tax. She also found that public schools become less effective as districts move from local property tax to statewide funding, that students receive better education in areas with local control, and public

support for public schools is stronger when local control exists.[7] This research does not outright claim that higher funding will result in higher student performance. Rather, it is the source of school funding that can have a significant impact on achievement. When local funding, rather than statewide funding, is used, there is incentive for people in the district to create strong and effective public schools because of the reflection that the value-added of public schools have on housing prices. Because people in the district are motivated to produce students who show great academic achievement, we can assume that when public school funding comes from local property taxes that there are increased, and relevant, resources available at the disposal of students, thereby producing high academic achievement in these areas.

We can see from this literature that local funding is the most important category of school district funding. When funding comes from local sources, it is the most impactful when assessing the impact of funding on academic achievement, as gauged by standardized tests. This is primarily because of the control that utilizing local funds has in relation to student achievement. When local funds are used, it creates a community incentive and a sense of responsibility to create public schools that deliver a quality education to the community's children. The community is also incentivized to create good schools because of the value that is added to housing prices when good public schools are funded in the area. We also see that there are various variables to consider when judging student performances through standardized tests, including participation. Because of this, it is important to consider tests that account for this variable, such as the federal NAEP test. When local funding and the NAEP test are used, we see

[7] Hoxby, Caroline. "Local Property Tax-Based Funding of Public Schools." *Hartland Institute*, no. 82 (May 19, 1997). https://www.heartland.org/_template-assets/documents/publications/9514.pdf.

that there is a positive relationship between school funding and high academic achievement. Next, we look at the relationship between school spending and academic achievement.

Spending

District spending is evaluated in terms of school spending per pupil. When determining how much to spend, decision-makers in local school districts consider the quality of education they would like to provide, ostensibly determined based on cohort SAT goals , its costs, and available resources to finance the spending. The three main categories of spending are preferences and institutions, costs, and resources. "'Preferences and institutions' reflects voters' preferences regarding desired educational output that have been discussed by local institutions that approve school budgets. Costs, on the other hand, may vary for several reasons including input price variations, economies of scale, and student characteristics such as special needs or bilingual students. Variations in resources are considerable across districts. Variations are largely attributable to differences in the amount of taxable property per pupil, or more recently, variations in the amount of federal or state spending received per district." Local school revenues not only depend on competing public desires but also private demands on taxpayer resources. The main drivers behind these three categories are the differing preferences and desires of district references. Most importantly, however, states' use of aid dollars rather than spending mandates can be viewed as an attempt to respect the preferences of district residents, while offsetting resource differences. Most states distribute school aid funds through 'equalization' formulas. These formulas ensure that the sum of state monies allocated to school districts are inversely related to local wealth.

In Bradbury's study of school spending in Massachusetts and Rhode Island, she sought to quantify the importance of each of the factors of spending in Massachusetts communities. She found that most of the aid dollars in Rhode Island were 'matching', unlike in Massachusetts. When aid is 'matching' it makes it cheaper for a district to raise each marginal dollar for schools, and therefore is thought to encourage spending. In both states, state funds were distributed in direct proportion to the number of students and inversely related to local property wealth, but in Rhode Island, state funding was also dependent on the district's actual spending. This matching principle would benefit poorer districts because they would receive higher matching rates. In Massachusetts, however, there is no incentive to spend local dollars on schools. Rhode Island's aid ultimately had a slightly greater equalizing impact. Spending disparities are larger in Massachusetts than in Rhode Island, but spending in Rhode Island per pupil was $100 greater per pupil. Clearly, aid formulas that support matching provide an incentive for districts to spend more marginal dollars on schools, although the difference is minimal.[8] Even though higher spending, in addition to higher funding, can positively impact academic performance, there are stipulations to this as well. Notably, it is the matching principle that benefits academic performance. Because it is easier for schools to raise each marginal dollar, therefore encouraging spending, we can attribute, to some degree, positive academic performance to school districts where the matching principle is utilized. However, the matching principle and this spending equalization literature only accounts for equalization in school districts overall. The next subsection examines intra-district spending inequalities.

[8] Bradbury, Katharine L. "School District Spending and State Aid: Why Disparities Persist." *New England Economic Review*, January/February 1994. http://www.bostonfed.org/economic/neer/neer1994/neer194d.pdf.

Minority Students

Minority students are defined as non-white students. Although being a minority student tends to coincide with being a poor student, this is not always the case. However, for simplicity, we can assume that minority students attend public schools that are primarily populated by low income students. The existence of intra-district inequality, which is the unequal distribution of funds across schools within districts, necessitates discussing how resources are allocated to disadvantaged students. Not only have Supreme Court rulings found resource differences unconstitutional, but also Title I of the Elementary and Secondary Education Act demands that districts that receive federal aid distribute their resources equitably. Ejdemyr and Shores' analysis of within-district spending inequality focuses on personnel expenditures, which track salary differences between schools. Specifically, they measured per pupil expenditure differences between poor, non-poor, black, white, and Hispanic students. The authors use the term minority to represent non-white students. The authors found that across nearly all districts in the United States, intra-district spending inequality is minimal. Average per-pupil spending on poor or minority students is only one to two percent higher than spending on non-poor, white students. Despite this, a large share of districts, specifically those districts with a smaller income gap between white and non-white parents, under-allocate resources to underprivileged students. However, districts with socioeconomic and racial segregation among schools allocate a greater share of resources and expenditures to poor and minority students, than to white students.[9] Under-allocation of resources to underprivileged or minority students does not necessarily mean that students who attend those under supported schools will show lesser academic performance

[9] Ejdemyr, Simon, and Kenneth A. Shores. "Pulling Back The Curtain: Intra-District School Spending Inequality and Its Correlates." May 19, 2017. https://sejdemyr.github.io/docs/ejdemyr_shores_schoolineq.pdf.

compared to students who attend adequately funded schools. Allocating a greater share of resources to minority students also does not necessarily mean that those students will perform better. In fact, those extra funds are simply a way to equalize the learning resources available to white and non-white students. However, we can postulate that students who attend schools with less funding, or schools that require extra funding in an attempt to equalize the resources available, comparatively may not perform as well as students who have greater per pupil expenditures at their disposal.

Researchers from Stanford note that it is harder to transform low performing schools into high performing schools than vice versa. Consistently low performing schools almost exclusively serve high-poverty populations. It is important to note this population, because one school may appear as though it is performing better than another school when measured by indicators such as reduced price lunch eligibility, but in fact, may serve different populations. Therefore, it is necessary to adjust for factors outside of the school, including student background factors, that may impact student performance. Among schools that have a high number of impoverished students, even the most successful students rarely meet state achievement goals. Schools must be assessed separately because the combination of different mechanisms for the selection of students with, potentially, different resource patterns does not properly account for outside forces that influence student achievement.[10]

When assessing the impact of intra-district inequality on minority and white students' academic achievement, we see that there are many variables to account for, namely: domestic life, work, and extracurriculars such as sports. We are not able to judge student performance

[10] Loeb, Susanna, Anthony Bryk, and Eric Hanushek. "Getting Down to Facts: School Finance and Governance in California." *Stanford University*, March 2007. https://cepa.stanford.edu/sites/default/files/GDF-Overview-Paper.pdf.

based solely on the overall performance of the school. There may be extenuating circumstances outside of the school's overall performance that may be impacting student performance. Because students have different resources available to them and because of any outside factors that may influence their academic success, we find that schools must be assessed separately. Assessing schools and students separately can support the creation of the adequate allocation of learning resources to white and minority students. The literature on this topic says that there is minimal intra-district spending inequality, but a higher allocation of resources to minority students in segregated districts. This higher allocation of resources, however, does not create inequity; rather, it creates an equalization of learning resources available to white and non-white students. There is no empirical evidence behind a strong, positive relationship between non-white students receiving a higher allocation of resources and a significant increase in student achievement, which may be due to not accounting for outside circumstances that influence their student achievement, such as home life, work, and sports. However, we can assume that if non-white students receive the same or more resources as white students to the extent that their learning experiences will be equalized, that there will be some increase in non-white student achievement. In the next and final section, we examine how financial reforms affect school district funding, spending, and the equalization of learning resources in an effort to understand the impact that these reforms have on student achievement.

Financial Reforms

The goal of school finance reforms is to weaken the relationship between school district wealth and per pupil expenditures. The reason that it is this particular relationship that finance

reforms aim to affect stems from the impact of local property taxes on public school funding. People tend to separate themselves into neighborhoods based on their incomes, so taxable property wealth available to school districts trends can show considerable variations between high-income and low-income neighborhoods. Reforms aim to weaken this relationship in a two-pronged manner: by increasing state aid to poorer districts and simultaneously restricting spending in richer districts. This is rationalized by the thought that students in poorer districts may fall behind because of inadequate resources available. However, critics complain that a large inflow of money to poorer districts make it unlikely that any meaningful improvement will occur.

Roy's case study on the impact of school finance reform on resources and academic improvement in Michigan found a significant positive effect on students' academic performance in the lowest-spending school districts, as measured by state tests. Michigan's school finance reform, Proposal A, increased state aid to the lowest-spending school districts and also largely eliminated local control of school spending. Roy found that Proposal A was successful in reducing school spending inequalities. Furthermore, Roy found that although there was a significant positive effect on academic performance in the lowest-spending districts, there was a caveat - improvement did not seem to have applied to performance, and more importantly participation, in college preparatory tests, such as the ACT. Surprisingly, he found evidence that may support the conjecture that the restrictions on spending that were placed on the highest-spending districts may actually have had a negative impact on student performance. The main policy implication that can be concluded from this research is that even though increasing available resources in the lowest-spending districts is highly correlated to a positive increase in

student performance, there are still disparities in student achievement across districts. Additionally, school finance reforms must be careful to avoid unintended consequences, such as the negative impact on student performance that occurred in the highest-spending districts.[11]

Jackson, Johnson, and Persico conducted research on the effects that school finance reforms have on student and economic outcomes. In their study, they linked school spending and school finance reform data to national data on children through 2011. Using court-mandated reforms and formula funding changes as exogenous factors affecting school spending, they compared adult outcomes of students that attended schools affected by different school financial reform policies. Their results found that an increase in spending per pupil, for children from low-income families, led to an increase in the number of school years completed, higher wages, and a reduction in the annual incidence of adult poverty. Even for children from above-poverty line households, the authors found effects, albeit smaller, of increased school spending on future educational attainment and positive family income. Exogenous spending increases were associated with improvements in inputs, including decreased student-to-teacher ratios and increased teacher salaries. The authors conclude that funding, along with school resources, and other sources of spending per pupil, affect student achievement and students' adult outcomes. These resources include the aforementioned inputs, such as student to teacher ratios. Increased per pupil spending does not necessarily guarantee improved student outcomes, but it may help improve them. Most critically, it is not the funding of schools, but how money is spent that is important.[12]

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[11] Roy, Joydeep. "Impact of School Finance Reform on Resource Equalization and Academic Performance: Evidence from Michigan." *SSRN Electronic Journal*, October 2003. doi:10.2139/ssrn.630121.

[12] Jackson, C. Kirabo, Rucker C. Johnson, and Claudia Persico. "The Effects Of School Spending On Educational And Economic Outcomes: Evidence From School Finance Reforms." *The Quarterly Journal of Economics* 131, no. 1 (February 1, 2016): 157-218. doi:https://doi.org/10.1093/qje/qjv036.

Research conducted at Stanford University shows that California lags behind other states in terms of academic achievement scores. The hypothesis of Loeb, Bryk, Hanushek, and associate's research was that improving California's school finance structures could enable its' schools to be more effective, boosting students' academic achievements. Their analysis focused on what resources were available to students and how they could be used to improve student outcomes. The researchers found that simply directing more money into the system will not improve student achievement. It will not meet expectations of achievement or needs of the students. The key piece is the ways in which resources, available, old, and new, are used. Investments in high-poverty schools will likely be necessary. However, financial investments will only be beneficial if they are accompanied by policy reforms. The governance system requires a complete reform. Simply introducing new programs to assist with the growth of student achievement will not create the desired achievement growth. The state must commit to creating the foundation that is needed to foster continuous improvement in an education system, and subsequently student achievement.[13]

Downes documented the changes in the distributions of spending and student performance that occurred post Vermont's school finance reform. Vermont's reform, titled Act 60, weakened the relationship between school spending and district property wealth. It has also reduced discrepancies in educational spending. The outcomes from the author's empirical analysis suggest that student performance has equalized to some extent in the period following the implementation of the reform. Post reform discrepancies in schooling outcomes has declined, but only marginally. In Vermont, there were only small improvements in test performances in

[13] Loeb, Susanna, Anthony Bryk, and Eric Hanushek. "Getting Down to Facts: School Finance and Governance in California." *Stanford University*, March 2007. https://cepa.stanford.edu/sites/default/files/GDF-Overview-Paper.pdf.

school districts that had low per pupil spending and property wealth, prior to the reform. This study, Downes claims, echoes a conclusion that other researchers who have conducted national analyses have arrived at, namely: finance reforms implemented in response to court orders have only minimal impact on student test performance.[14] This finding that finance reforms have only a marginal impact on test performance is, at first glance, contradictory to previous articles that I have cited. However, previous findings have shown that a change in the allocation of resources is what ultimately has an impact on test performances. It may appear that because finance reforms are the catalyst for the improvement of student resources, and because an increase in student resources tends to have a positive impact on test performances, that because a finance reform has occurred, test performances will automatically improve. However, just because a financial reform has occurred, and a school has received more funding, it does not mean that new funds are automatically applied to relevant resources that positively impact student academic achievement. Therefore, we assume that it is not financial reforms, but in fact, the allocation of funds towards relevant resources that can contribute positively to academic achievement, or test performances.

A commentary published by Johns Hopkins School of Education looks at the general relationship between an increase in educational funding and the potential yield of better educational outcomes. The commentary summarizes that variation in school inputs account for very little of the variation in student achievement. Spending plays a negligible role in determining educational outcomes, such as test scores. However, this conclusion is drawn from a search for evidence that increased spending usually improves educational outcomes. Analyses

[14] Downes, Thomas. "School Finance Reform and School Quality: Lesson from Vermont." *Tufts University*, October 2002. http://ase.tufts.edu/economics/papers/200309.pdf.

that find that there is a positive relationship between resource inputs and school outcomes merely ask if there is at least one situation in which a positive relationship exists.[15] This commentary does not disprove the assumption that there is a positive relationship between resource inputs and academic achievement, specifically test scores. However, it does point out the necessity of clarifying what kind of result one is searching for when conducting research. For the purposes of this research, where I am asking if there is at least one situation in which a positive relationship exists, my hypothesis that there is a positive relationship is supported.

The main takeaway from this literature on finance reforms is that resources have a strong relationship with student academic performance. An increase in the availability of resources has been shown to have a positive correlation with student achievement and adult success outcomes. However, the strong positive correlation can only be said with certainty when asking if there is at least one situation where this exists. We cannot make a generalization or claim that there is usually a strong positive correlation between these two factors. But, in at least one situation, as shown in Vermont for example, there is a strong positive correlation between resource inputs and student achievement. However, when creating finance reform policies to encourage adequate resource distribution, care must be taken to avoid unintended consequences. Although an increase in resources in the lowest-spending districts has a high and positive correlation to an improvement in student resources, a notable consequence that should be avoided is the negative impact on student performance that spending restrictions placed on high-spending districts have produced. Still, although with certain caveats, increasing available resources to low spending and

[15] Bjorklund-Young, Alanna. "Does Money Matter?" Institute for Education Policy. November 2017. http://edpolicy.education.jhu.edu/wp-content/uploads/2017/05/Does-Money-Matter-Commentary.pdf.

poorly funded districts has shown at least one circumstance where a positive correlation between resources and student achievement exists.

In sum, the major views of studies conducted on school finance reforms, school spending, school funding, and academic achievement generally concur that increased spending at low income schools positively impacts students' academic achievement. There are caveats, such as which standardized test is used to gauge academic achievement and the ease with which districts can raise marginal dollars under the matching dollar scenario. It is important to note that it is not just money, but how money is allocated to certain resources, like teacher salaries and pupil-to-teacher ratios, that truly impacts student achievement. Additionally, the question that the researcher is asking impacts which general consensus the researcher can use to support their hypotheses. Despite this, and most relevant to this paper, the overarching conclusion is that an increase in funding and spending for underfunded school districts, the reduction of intra-district funding inequalities, and an equitable increase in the allocation of learning resources does positively impact students' academic performance in at least one scenario, which can be gauged via standardized tests scores.

An analysis of the crisis and financial reform in the Oakland Unified School District (OUSD) follows suit with previous research that suggests that it is not only money, but how resources are deployed that can truly impact student achievement. In the assessment of necessary next steps, de-regulation, innovation, flexibility, high standards, increased parental choice, and competition are mentioned as factors that can positively impact student achievement.[16] In the coming sections, I will analyze the Oakland Unified School District's funding, student

[16] Coburn, K. Gwynne, and Pamela A. Riley. "Failing Grade: Crisis and Reform in the Oakland Unified School District." July 2000. http://www.csun.edu/~th73110/oaklandschools.pdf.

achievement rates via standardized test scores, and student inputs and resources to evaluate the impact of educational funding on student achievement.

3 Methods

The goal of this study is to determine if well-funded public education that incurs constructive expenditures contributes positively to high standardized test scores. In addition to funding and spending, the results from my empirical analysis examine other notable factors identified earlier as leading determinants of standardized test scores. I am using Oakland, California as my case study and the variables that I will use to conduct my empirical analysis include: school district revenue, school district expenditures, ethnicity, and an index of STAR test scores. I will be examining the time period of 1997 - 2004, because of the relevant financial reform that occurred within the OUSD during the period of 1999 - 2003. The decade after 2003 should potentially help reveal partial successes behind the aforementioned reform.

School district revenues for Oakland Unified School District are separated into three dollar categories: local, state, and federal. Local revenues include such sources as local property taxes, investments, revenues from student activities, and intermediate sources. State revenues include restricted and unrestricted grants, revenue in lieu of taxes, and payments on behalf of the school district. Federal revenues include direct grants, funds distributed through the state or other agency, and revenues in lieu of taxes.[17] Expenditures are separated into instruction, support services, capital spending, debt and government payments, and other. The NCES defines instruction expenditures as expenditures for activities related to instruction, activities, and

[17] "Revenues and Expenditures for Public Elementary and Secondary Education." National Center for Education Statistics (NCES). https://nces.ed.gov/pubs2011/expenditures/appendix_b.asp.
Appendix B: Common Core of Data Glossary

interactions between teachers and students. Support services include attendance, social work, guidance, and counseling. Capital spending is expenditures for the purchases and improvements of equipment, land, and capital assets. Debt and government payments include long-term credit obligations and interest-bearing short-term obligations. Other encompasses any other expenditures that the school district incurs. This includes community service, adult education, community college, business support services, and other similar expenditures.[18] From the literature review, we know that expenditures on student resources is a key variable when considering the impact of school district funding and student academic achievement. Expenditures are broken down only into these five categories. However, key ratios such as pupil-teacher ratios and other relevant academic resources with a significant impact on student's academic achievement are categorized primarily under instruction and support services expenditures, per the definitions from the NCES. Ethnicity data provides numbers on white not hispanic students enrolled in the OUSD and non-white students. Non-white students are separated into the categories of African American not Hispanic, American Indian or Alaska Native, Asian, Filipino, Hispanic or Latino, Pacific Islander, and Multiple or No Response. The Standardized Testing and Reporting (STAR) program administered in California is the standardized test that I use to assess the impact of educational funding. The STAR test was administered from 1998 to 2013. The STAR tests were administered every spring to California public school students, grades 2 through 11 with its components of reading, math, language, spelling, science, and social science.[19] I use reading, math, language, and spelling scores as they

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[18] "Revenues and Expenditures for Public Elementary and Secondary Education." National Center for Education Statistics (NCES). https://nces.ed.gov/pubs2011/expenditures/appendix_b.asp.
Appendix B: Common Core of Data Glossary

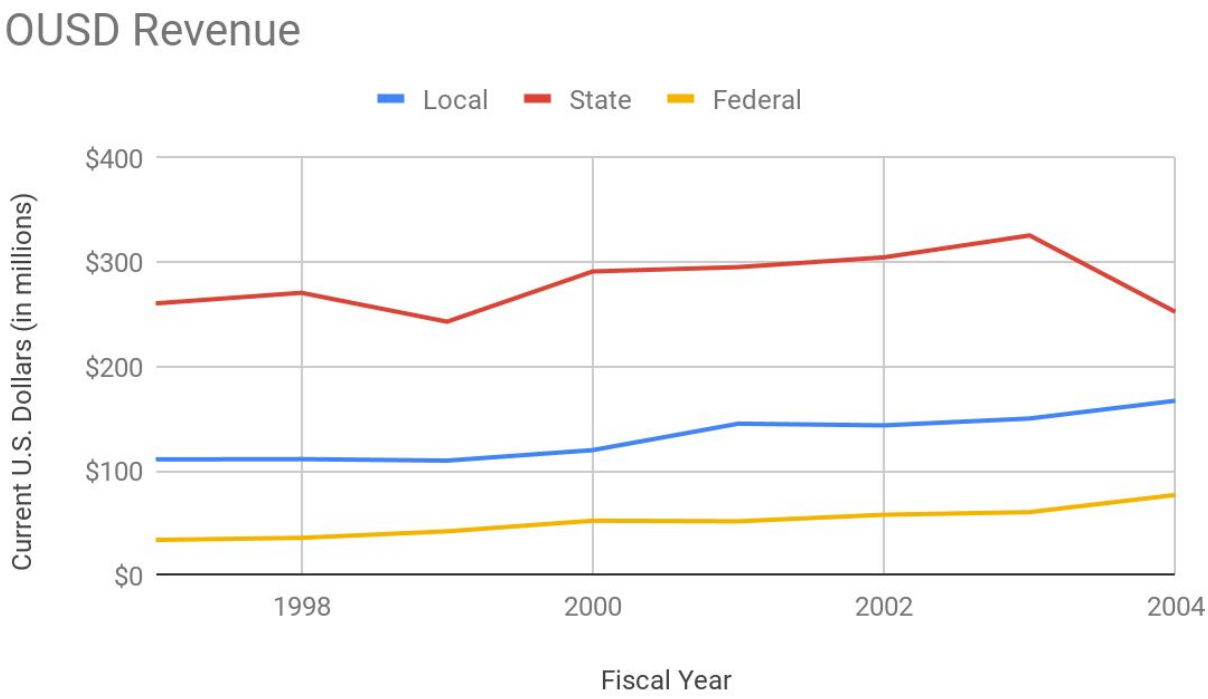
[19] "STAR District Summary Report." California Standardized Testing And Reporting (STAR) Program. https://star.cde.ca.gov/star98/reports/01-61259-0000000.html.

have the most available data. I show, however, graphs only for reading as the primary purpose of STAR testing is to assess reading; the other testing categories were added after the reading test was created. Opting out of STAR testing is hard, although not impossible, as districts may choose to opt out. Generally, however, every public school student was mandated to take STAR tests. As discussed earlier in the literature review, standardized tests that are not biased by student participation are ideal. Because student participation was mandated, STAR testing was distributed to public schools, and it was in effect during the OUSD financial reform, I have chosen this standardized test to judge the impact of school district funding.

Since NCES observations are recorded annually, my time period only provides 7 instances. I calculate the correlation of the variables and carefully examine the relationship between revenues, expenditures, and STAR test scores. Correlation patterns and statistics help provide only partial support behind my hypothesis that an increase in revenue and certain expenditures positively relate to STAR test scores. When calculating the correlation of the variables, the dependent variables are the mean scaled scores from each OUSD STAR testing category, reading, math, language, and spelling. The independent variables are local revenues, state revenues, federal revenues, instruction expenses, support expenses, capital spending, and debt and government payments. I chose these particular revenue subcategories to gauge the impact of local revenues in this particular school district, as conducted in other empirical analyses. As seen in the literature review, local funding is closely tied to test scores. I chose to correlate the instruction and support expenses categories because of their impact on academic resources.

The following are graphs of key data including revenue, expenditures, ethnicity, and OUSD and California reading mean test scores.

Figure 1

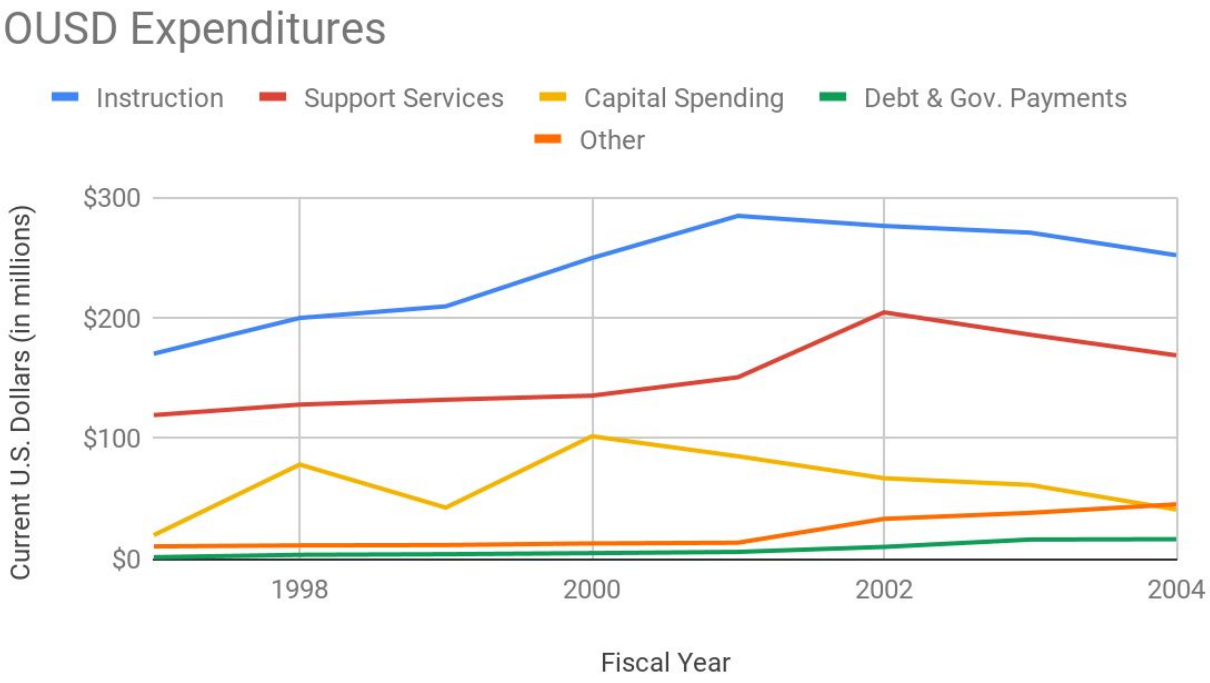


Source: "Oakland Unified School District, California." Ballotpedia https://ballotpedia.org/Oakland_Unified_School_District,_California.

Figure 1 shows local, state, and federal revenues for the Oakland Unified School District during the 1997-2004 time period. We can see that in both 1999 and 2003, the beginning and end dates of the California financial reform, there is a fluctuation in state revenue. State revenues decrease as a result of the reform and the reallocation of funds among different school districts in the state. However, there are no noticeable fluctuations in local and federal revenues, other than their continued increase over this time period. Local revenues increased from $110,845,000 to $167,031,000. State revenues decreased from $260,353,000 to $252,241,000. Federal revenues

increased from $33,680,000 to $76,751,000. Total revenues increased from $404,878,000 to $496,023,000 from 1997 to 2004.

Figure 2

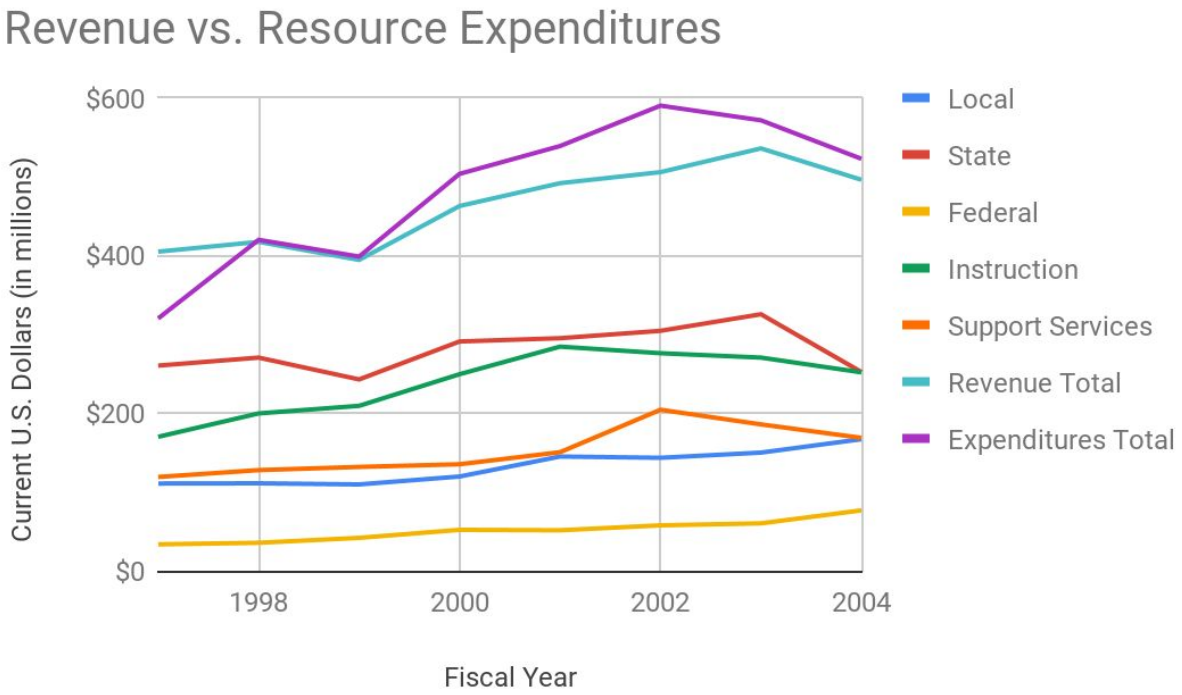


Source: "Oakland Unified School District, California." Ballotpedia https://ballotpedia.org/Oakland_Unified_School_District,_California.

Figure 2 shows instruction, support services, capital spending, debt and government payments, and other expenditures in the OUSD during 1997-2004. Within the 1999-2003 financial reform period, all the expenditures categories experience fluctuations. Instruction expenditures increase from $170,083,000 to $251,806,000. Support services increase from $119,140,000 to $168,716,000. Capital spending increased from $19,514,000 to $40,794,000. Debt and government payments increased from $1,227,000 to $16,173,000. Other expenditures

increased from $10,197,000 to $45,108,000. Total expenditures increased from $320,161,000 to $522,597,000 from 1997 to 2004.

Figure 3

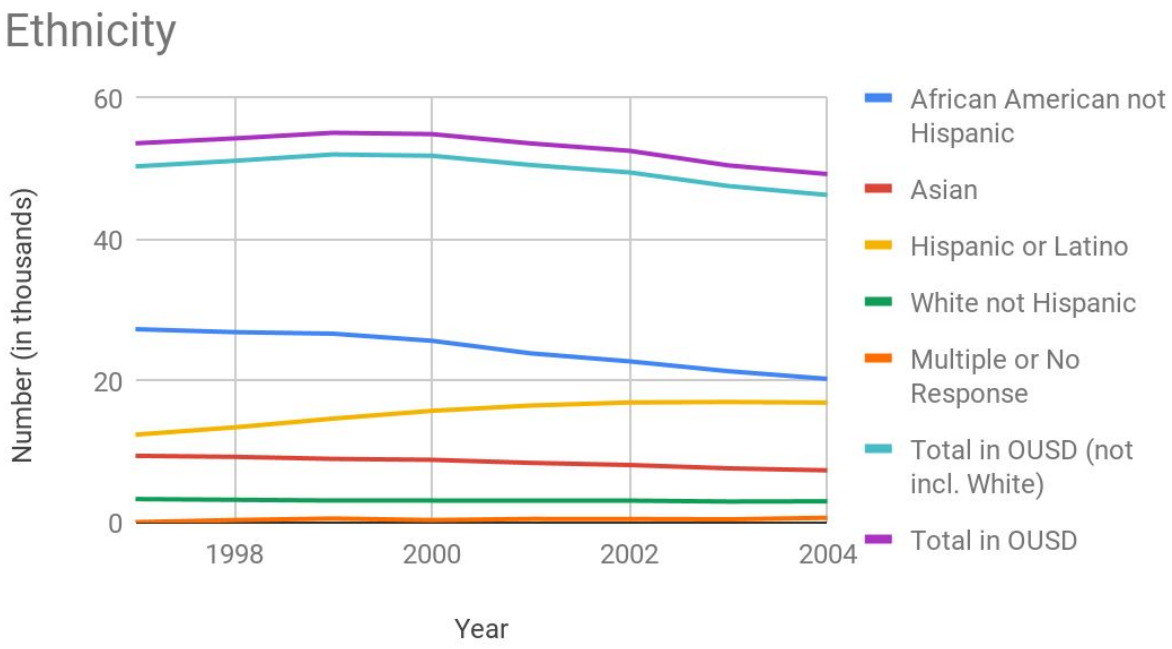


Source: "Oakland Unified School District, California." Ballotpedia
https://ballotpedia.org/Oakland_Unified_School_District,_California.

Figure 3 compares sources of revenue and resources expenditures in the OUSD. The graph shows that over time, total expenditures are higher than total revenue, but that the gap is narrowing around 2004. This indicates that fluctuations in revenues and expenditures did occur during the financial reform period, but after the financial reform revenues and expenditures begin to equalize. But, expenditures continue on a downward trajectory. As shown in Figure 1, state revenues decrease around 2003, just like total expenditures. We can conclude from this that total expenditures decrease as a result of the statewide financial reform and the reallocation of state

funds to different school districts. State revenue is the largest revenue category so as state revenues decrease, total expenditures must decrease too. In the aftermath of the finance reform, total expenditures appear to fall at a faster rate than instruction and support expenditures. The largest decrease in expenditures post reform was capital spending, so we can attribute at least some of the decrease in total expenditures to the decrease in capital expenditures. We can see that state funding is higher than instruction expenditures, leading to the conclusion that instruction expenditures, which is the most relevant category of expenditures in terms of academic resources, ostensibly comes from primarily state rather than local funding sources.

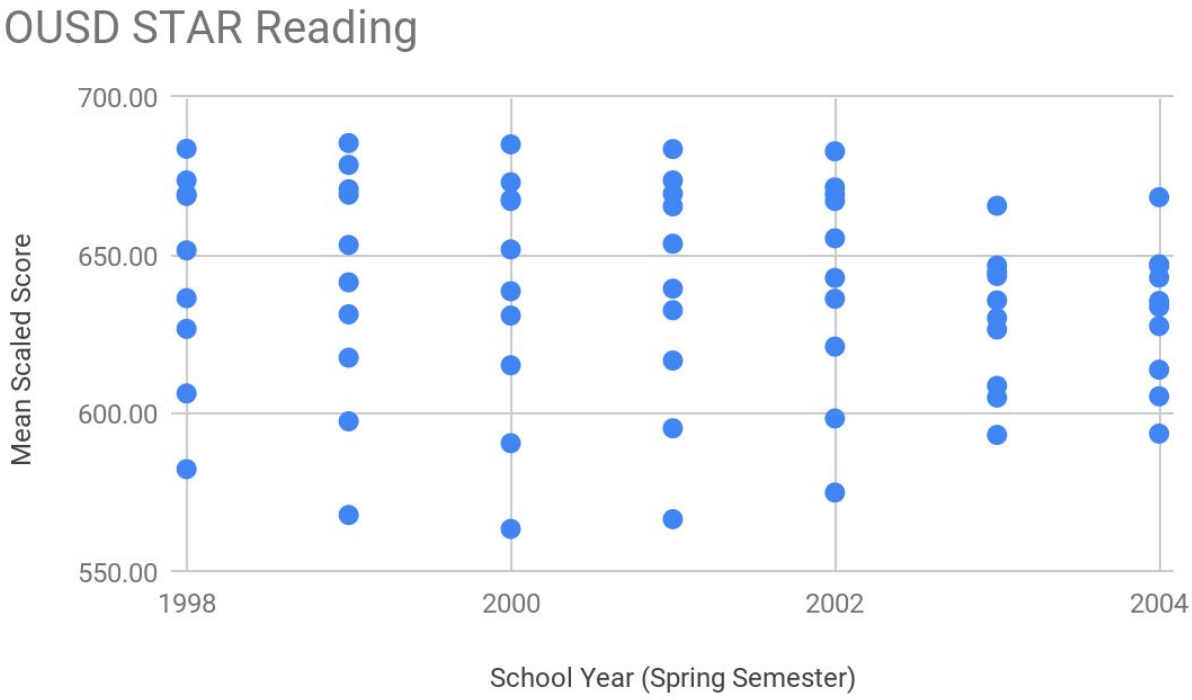
Figure 4



Source: DataQuest (CA Dept of Education). https://dq.cde.ca.gov/dataquest/cbeds3.asp?cYear=1997-98&PctBlack=on&PctAm=on&PctAsian=on&PctFil=on&PctHisp=on&PctPac=on&PctWhite=on&PctMult=on&cSelect=0161259--OAKLAND^UNIFIED&cChoice=DstProf1&cLevel=District&cTopic=Profile&myTimeFrame=S&submit1=Submit.

Figure 4 shows the ethnicity categories of students enrolled in the OUSD. Over time, the total students enrolled in the OUSD decreases. We can also see that there are more non-white students in the OUSD than white students. Based off of information gathered from the literature review on ethnicity, we can assume that there is a gap in funding between white and non-white students, and therefore, a gap in test scores between white and non-white students.

Figure 5



Source: California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/01-61259-0000000.html.

Figure 5.1

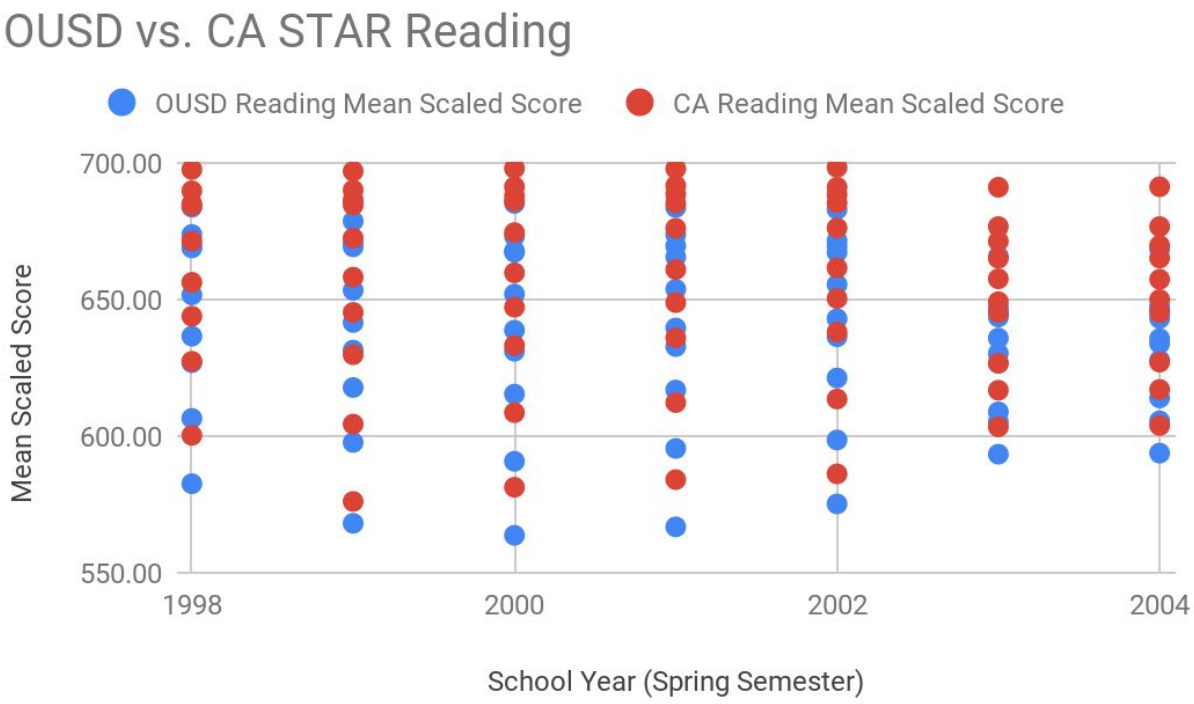
OUSD STAR Reading Mean Scaled Score Descriptive Statistics

Mean	636.967
Median	640.5
Mode	673.7
Standard Deviation	33.367
Range	128.6
Minimum	556.9
Maximum	685.5
Sum	44587.7
Count	70
Largest	685.5
Smallest	556.9

Source: Data compiled and analyzed by author. All work is author's own.

Figure 5 shows a scatter plot of all OUSD STAR test reading mean scaled scores for all students in the OUSD during the case study time period. We can see that there is a wide range of test scores until 2003, the end of the financial reform period. In 2003 and 2004, the plot begins to narrow as scores settle into the 600-650 mean scaled score range. This indicates that the reform had an equalizing impact on test scores, and we can assume that because of this, revenues and expenditures were equalized as well. We can also see that while some scores increased, other scores decreased. Ideally, all scores would increase, but the lowest scores increasing is a positive step in the right direction as funds are redistributed to the lowest performing schools to increase their test scores. The top performing students will continue to perform well, even as funds are allocated to low performing students to give them the resources they need to perform well, too.

Figure 6



Source: California Standardized Testing And Reporting (STAR) Program. https://star.cde.ca.gov/star98/reports/01-61259-0000000.html.
Source: California Standardized Testing And Reporting (STAR) Program. https://star.cde.ca.gov/star98/reports/00-00000-0000000.html.

Figure 6 shows the OUSD STAR test reading mean scaled scores and the California (CA) STAR test reading mean scaled scores. We can see that although the OUSD scores tend to be lower than the California scores, both the OUSD and CA scores follow a similar pattern of having a narrowing gap in test scores circa 2003. The reform clearly had an equalizing impact on test scores, not only in the OUSD but also statewide. This indicates that revenues and expenditures were equalized in the district and also on a statewide level. We can also see that while some scores increased, other scores decreased statewide and within the OUSD. Ideally, all scores would increase, but the lowest scores increasing is a positive step in the right direction as

funds are redistributed to the lowest performing schools to increase their test scores. The top performing students will continue to perform well, even as funds are allocated to low performing students to give them the resources they need to perform well, too.

4 Summary and Interpretation of the Results

Correlation Matrix

1997-2004	Local Revenue	State Revenue	Federal Revenue	
Reading	0.884	0.501	0.926	
Math	0.919	0.463	0.958	
Language	0.905	0.436	0.954	
Spelling	0.862	0.827	0.974	
	Instruction Expenditures	Support Expenditures	Capital Spending	Debt and Government Payments
Reading	0.888	0.833	0.271	0.891
Math	0.870	0.836	0.227	0.905
Language	0.866	0.834	0.206	0.894
Spelling	0.931	0.857	0.504	0.877

Source: Data compiled and analyzed by author. All work is author's own.

The correlation that I conducted ranges between -1 and +1, with negative one being a strong negative correlation and +1 being a strong positive correlation. We can see that a high total revenue has a strong positive correlation with all four tests, although the correlation between total expenditures and mean scaled test scores is even higher. Local revenues and federal revenues have the highest positive correlation with the test scores. Federal revenue has the highest positive correlation with the test scores, even higher than local revenue, indicating that local revenue does have an impact on test scores, but in this case, federal revenue has a

stronger relationship. State revenues have a positive correlation with the test scores, but it is significantly lower than state and federal revenues. Instruction expenditures have the highest positive correlation with test scores, indicating that it is activities related to instruction, activities, and interactions between teachers and students that have the greatest impact on test scores, rather than support services that include attendance, social work, guidance, and counseling. Debt and government payments also have a high positive correlation with test scores, indicating that the size of this expenditures category affects the amount of funding allocated to relevant educational resources, and the subsequent positive impact on test scores. Support services do have a positive correlation with test scores, but the correlation degree is marginally lower than instruction expenditures. Capital spending has a positive, but significantly lower, impact on test scores. This category should be considered when considering the impact of expenditures on test scores, but it is not the most relevant category of expenditures. An increase in both the instruction and support services expenditures categories would benefit test scores, but instruction expenditures have a slightly greater positive impact.

In general, there is partial descriptive support behind my hypothesis that adequate funding and expenditures for public schools has a positive impact on standardized test scores. From this partial evidence, I observe that, at least in the OUSD during this time period that also includes a financial reform, federal revenue, local revenues, and instruction expenditures are the three key categories from revenues and expenditures that have the greatest influence on the main four STAR testing scores, as shown by their high positive correlations with the STAR test categories' mean scaled scores.

5 Limitations and Potential Avenues for Future Research

The main limitation that I encountered while conducting this research was the availability of data. I originally planned to conduct my analysis on the time period of 1995-2007. This is because of the 1999-2003 reform, accounting for a four year period on either side to properly assess changes that would occur. This effort was futile. Financial data and testing scores are only available after 1995. Because budget data for OUSD is critical to my analysis, I adjusted my time frame to accommodate for the lack of available data and also decided to use STAR testing because it did not begin until the 1997-1998 school year. I also chose to extend my timeframe in order to explore long term impacts of the changes that occurred. Nevertheless, this timeframe is insufficient as it does not provide the close examination of the period surrounding the financial reform that I was hoping to conduct.

I was also unable to find complete data for STAR testing scores after 2004. The data skips grades and only showed grades 3 and 7 after the 2004 testing period. Even before 2004, science and social science test scores were only available for grades 9 through 11. Spelling scores were only available for grade 2 through 9. I chose to omit the science and social science scores from my analysis simply because there were not enough data points to ensure that I conducted a reasonable correlation test.

Another limitation that I faced had to do with the specificity of my research question and hypothesis. Per Bjorklund-Young's analysis that found that there is a positive relationship between resource inputs and school outcomes only if there is at least one situation in which a positive relationship exists, I had to narrow the delineation of my research. Because I originally intended to research the relationship between funding and test scores on a global scale, I was

looking to find the general relationship between public education funding and student achievement, I would have had to adjust my hypothesis to account for research that claims that there is a negative relationship between these two factors. Because I am examining only one instance, I can hypothesize that there is a positive correlation between funding and achievement. My hypothesis only applies to this particular school district that I analyzed. Had I applied my hypothesis globally, it may have been misleading and disproven.

The type of standardized test that I was able to use was another limitation that I found while researching. Originally, I wanted to use the SAT test, as it is a widely known and taken test, and is necessary for most college admissions. However, because the SAT test scores can be affected by participation, I had to find another standardized test. The STAR test is not impacted by student participation, but, it is not as well known as the SAT test so some states have chosen to opt out. STAR does have its advantages, as it is a mandatory examination, rather than voluntary. However, looking forward towards higher education and other adult success outcomes, the SAT holds more value as it is commonly used to judge who is let into bachelor's programs, the completion of which increases the potential for success in that individual's life. Therefore, although STAR testing has its advantages, the inability to use a test that impacts adult success outcomes decreases the value of my assessment.

A serious limitation that I faced as I analyzed my correlation was that I could not address the equalization of funds across the Oakland Unified School District. The data that I was able to find regarding the OUSD's funding did not break down funding by school or ethnicity. I was not able to ascertain if the adjustment in funds that occurred during the financial reform, that

contributed to the equalization of test scores, were being taken from already unserved schools or from schools that already had an overly large share of financial resources allocated to them.

There are many potential avenues for future research from this study. One is to find the breakdown of revenues and expenditures to determine if there was an equalization of funds or if the funds that were reallocated to create and equalization of test scores were taken from already unserved schools without adequate funding. Another potential research topic is to find the relationship between white and non-white students and STAR or other standardized tests' mean scaled scores. I believe this would show the necessity of adequate funding even more deeply as non-white students tend to attend poorly funded and public schools. One final research opportunity is to compare test scores across districts and within districts with the majority of revenues coming from local and federal sources. This would show the impact of local and federal revenues on test scores in more than one instance, and support future research that considers the impact of adequate public school funding on test scores across and within districts and states.

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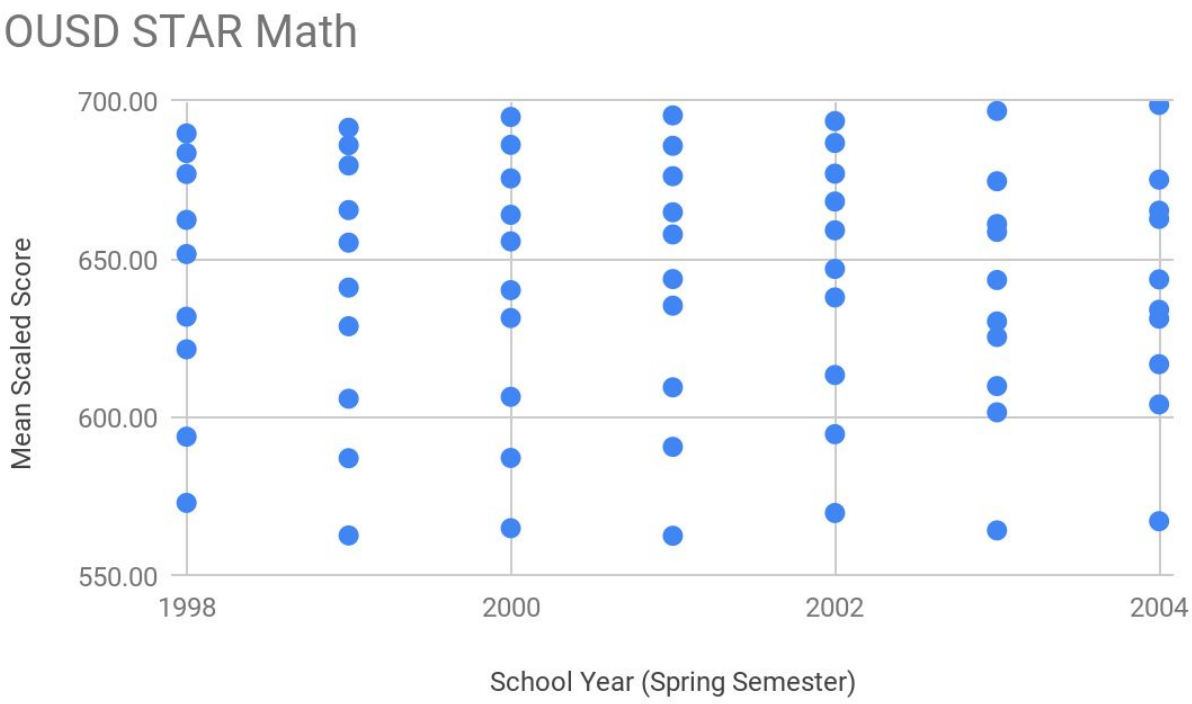
7 Appendix

Figure A.1



Source: California Standardized Testing And Reporting (STAR) Program. https://star.cde.ca.gov/star98/reports/01-61259-0000000.html.

Figure A.1.1

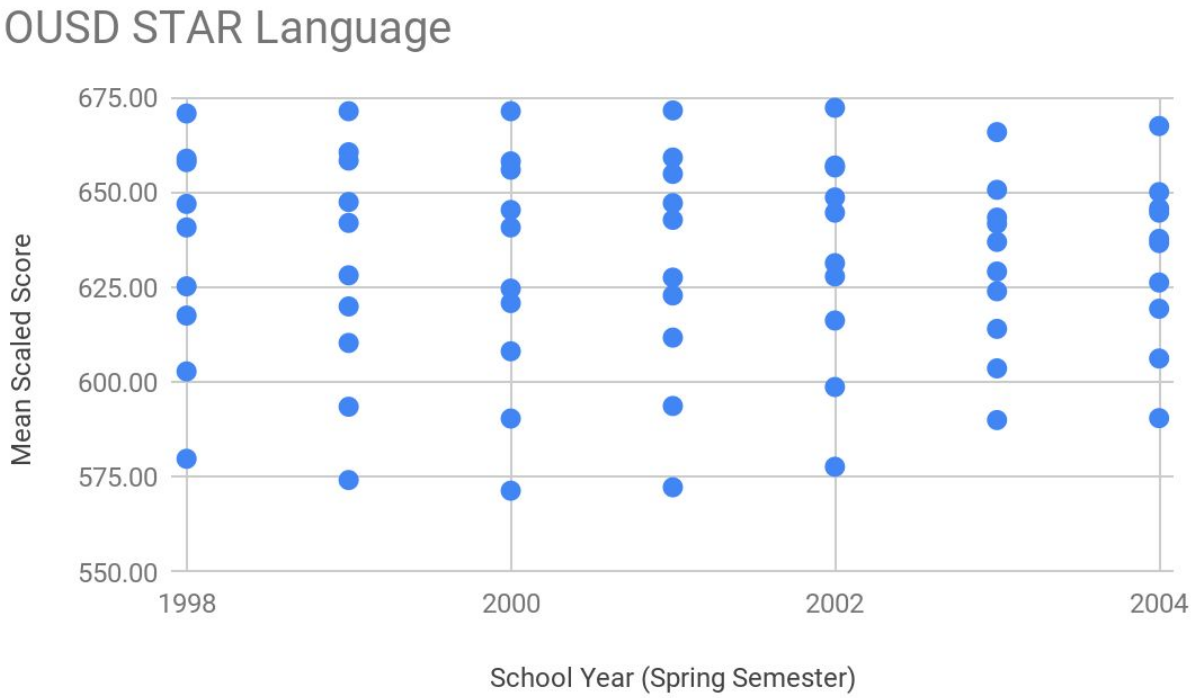
OUSD STAR Math Mean Scaled Score Descriptive Statistics

Mean	639.814
Median	643.75
Mode	N/A
Standard Deviation	40.655
Range	146.5
Minimum	552.3
Maximum	698.8
Sum	44787
Count	70
Largest	698.8
Smallest	552.3

Source: Data compiled and analyzed by author. All work is author's own.

Figure A.1 shows a scatter plot of all OUSD STAR test math mean scaled scores for all students in the OUSD during the case study time period. We can see that there is a wide range of test scores until 2003, the end of the financial reform period. In 2003 and 2004, the plot begins to narrow as scores settle into the 600-675 mean scaled score range. This indicates that the reform had somewhat of an equalizing impact on test scores.

Figure A.2



Source: California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/01-61259-0000000.html.

Figure A.2.1

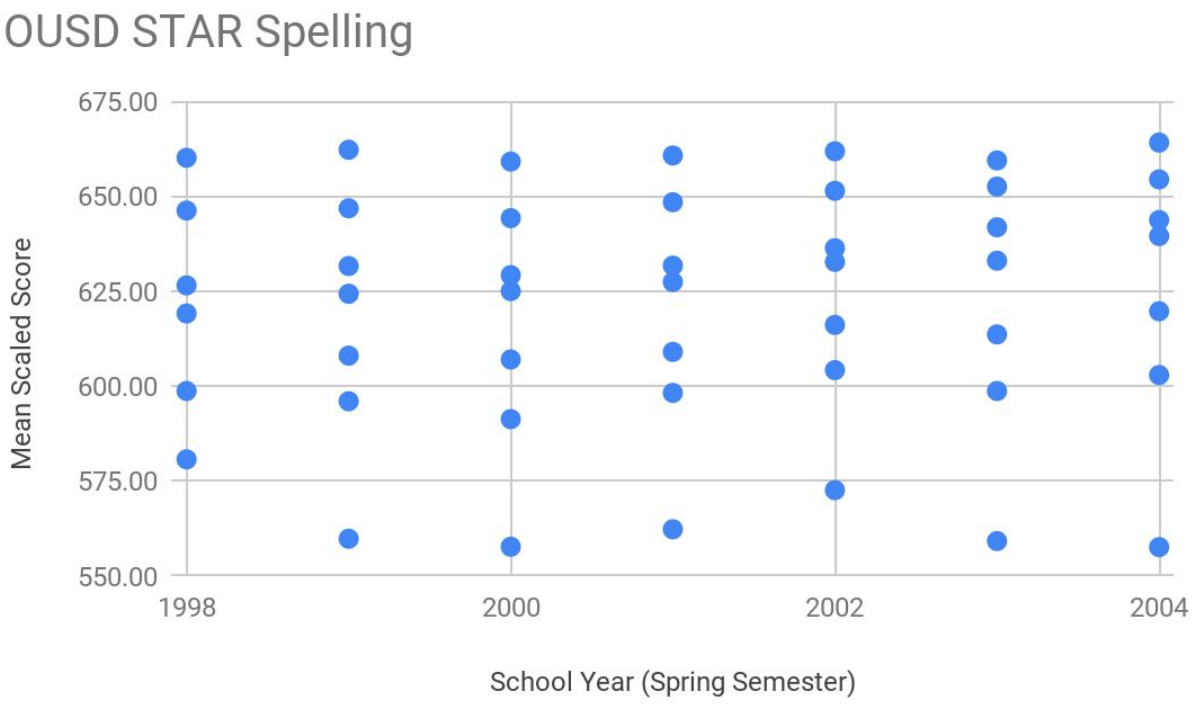
OUSD STAR Language Mean Scaled Score Descriptive Statistics

Mean	630.227
Median	636.75
Mode	640.7
Standard Deviation	28.149
Range	105.5
Minimum	566.7
Maximum	672.2
Sum	44115.9
Count	70
Largest	672.2
Smallest	566.7

Source: Data compiled and analyzed by author. All work is author's own.

Figure A.2 shows a scatter plot of all OUSD STAR test language mean scaled scores for all students in the OUSD during the case study time period. We can see that there is a wide range of test scores until 2003, the end of the financial reform period. In 2003 and 2004, the plot begins to narrow as scores settle into the 600-650 mean scaled score range. This indicates that the reform had somewhat of an equalizing impact on test scores. We can also see that while some scores increased, other scores decreased. Ideally, all scores would increase, but the lowest scores increasing is a positive step in the right direction as funds are redistributed to the lowest performing schools to increase their test scores. The top performing students will continue to perform well, even as funds are allocated to low performing students to give them the resources they need to perform well, too.

Figure A.3



Source: California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/01-61259-0000000.html.

Figure A.3.1

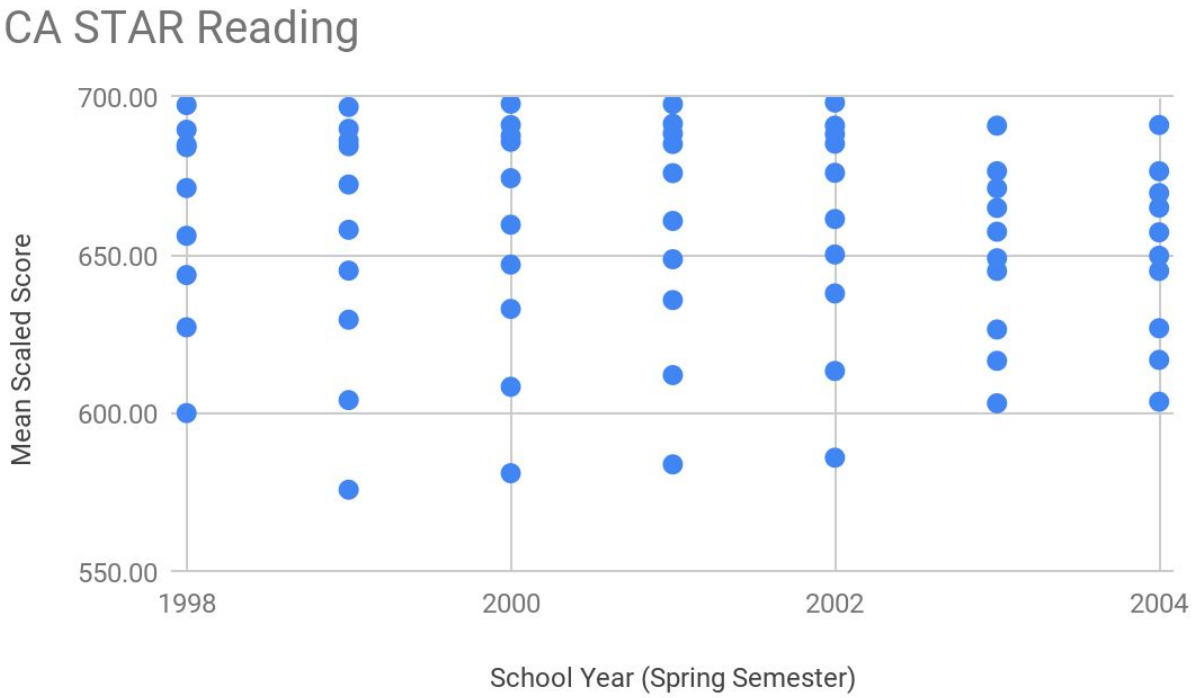
OUSD STAR Spelling Mean Scaled Score Descriptive Statistics

Mean	619.902
Median	626.5
Mode	598.7
Standard Deviation	32.740
Range	115.3
Minimum	548.8
Maximum	664.1
Sum	30375.2
Count	49
Largest	664.1
Smallest	548.8

Source: Data compiled and analyzed by author. All work is author's own.

Figure A.3 shows a scatter plot of all OUSD STAR test spelling mean scaled scores for all students in the OUSD during the case study time period. We can see that there is a wide range of test scores until 2003, the end of the financial reform period. In 2003 and 2004, the plot begins to narrow as scores settle into the 600-660 mean scaled score range. This indicates that the reform had somewhat of an equalizing impact on test scores, and we can assume that because of this, revenues and expenditures were equalized as well.

Figure A.4



Source:California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/00-00000-0000000.html.

Figure A.4.1

CA STAR Reading Mean Scaled Score Descriptive Statistics

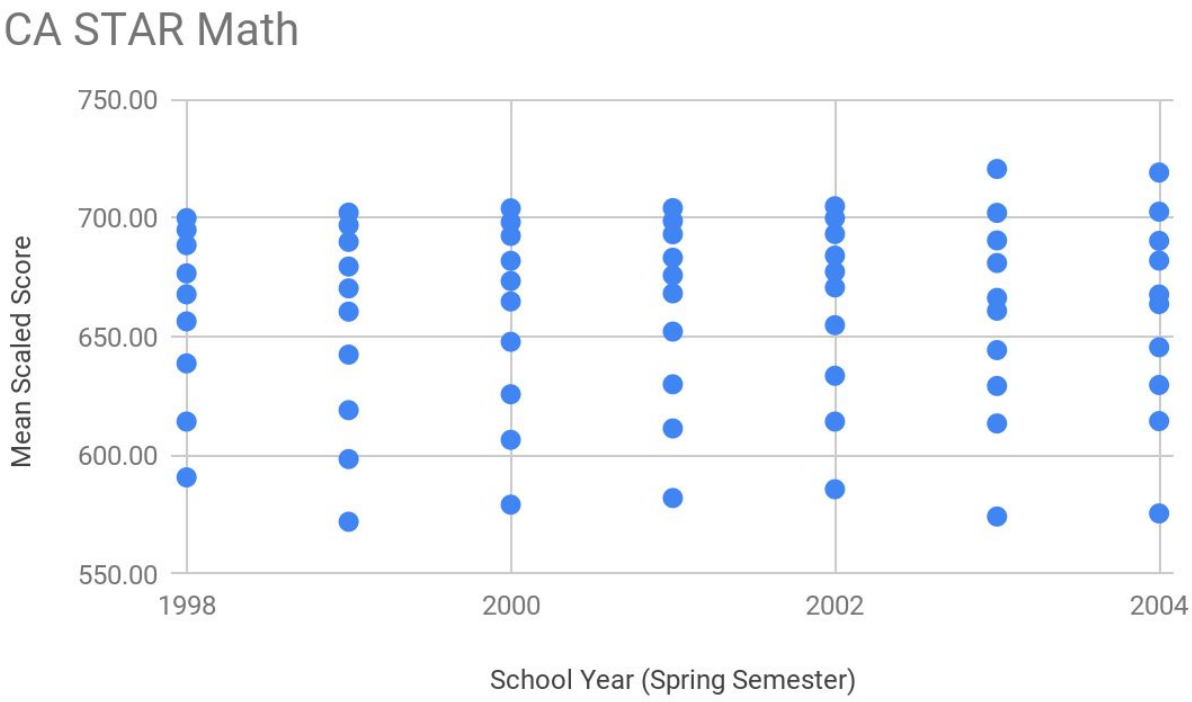
Mean	654.44
Median	660.3
Mode	691.2
Standard Deviation	34.894
Range	126.9
Minimum	571.4
Maximum	698.3
Sum	45810.8
Count	70
Largest	698.3
Smallest	571.4

Source: Data compiled and analyzed by author. All work is author's own.

Figure A.4 shows a scatter plot of all CA STAR test reading mean scaled scores for all students in CA during the case study time period. We can see that there is a wide range of test scores until 2003, the end of the financial reform period. In 2003 and 2004, the plot begins to narrow as scores settle into the 600-700 mean scaled score range. This indicates that the reform had somewhat of an equalizing impact on test scores, and we can assume that because of this, revenues and expenditures were equalized as well. We can also see that while some scores increased, other scores decreased. Ideally, all scores would increase, but the lowest scores increasing is a positive step in the right direction as funds are redistributed to the lowest performing districts to increase their test scores. The top performing students in the state will

continue to perform well, even as funds are allocated to low performing students to give them the resources they need to perform well, too.

Figure A.5



Source:California Standardized Testing And Reporting (STAR) Program. https://star.cde.ca.gov/star98/reports/00-00000-0000000.html.

Figure A.5.1

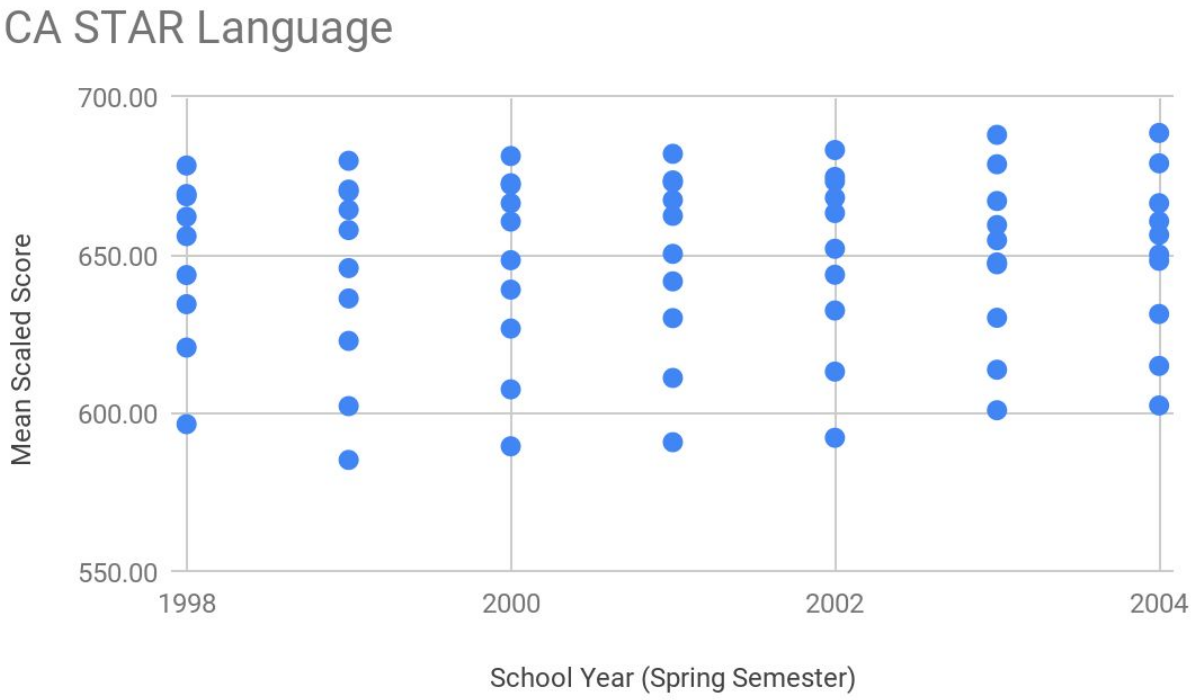
CA STAR Math Mean Scaled Score Descriptive Statistics

Mean	656.96
Median	667.75
Mode	614.2
Standard Deviation	41.215
Range	155.7
Minimum	564.9
Maximum	720.6
Sum	45987.2
Count	70
Largest	720.6
Smallest	564.9

Source: Data compiled and analyzed by author. All work is author's own.

Figure A.5 shows a scatter plot of all CA STAR test math mean scaled scores for all students in CA during the case study time period. We can see that there is a wide range of test scores until 2003, the end of the financial reform period. In 2003 and 2004, the plot begins to widen, contradictory to the other plots of test scores. This indicates that the reform did not impact math test scores as it did other testing categories. Likely, not enough resources were allocated to help students with math, or there was another extenuating circumstance that impacted the scores.

Figure A.6



Source:California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/00-00000-0000000.html.

Figure A.6.1

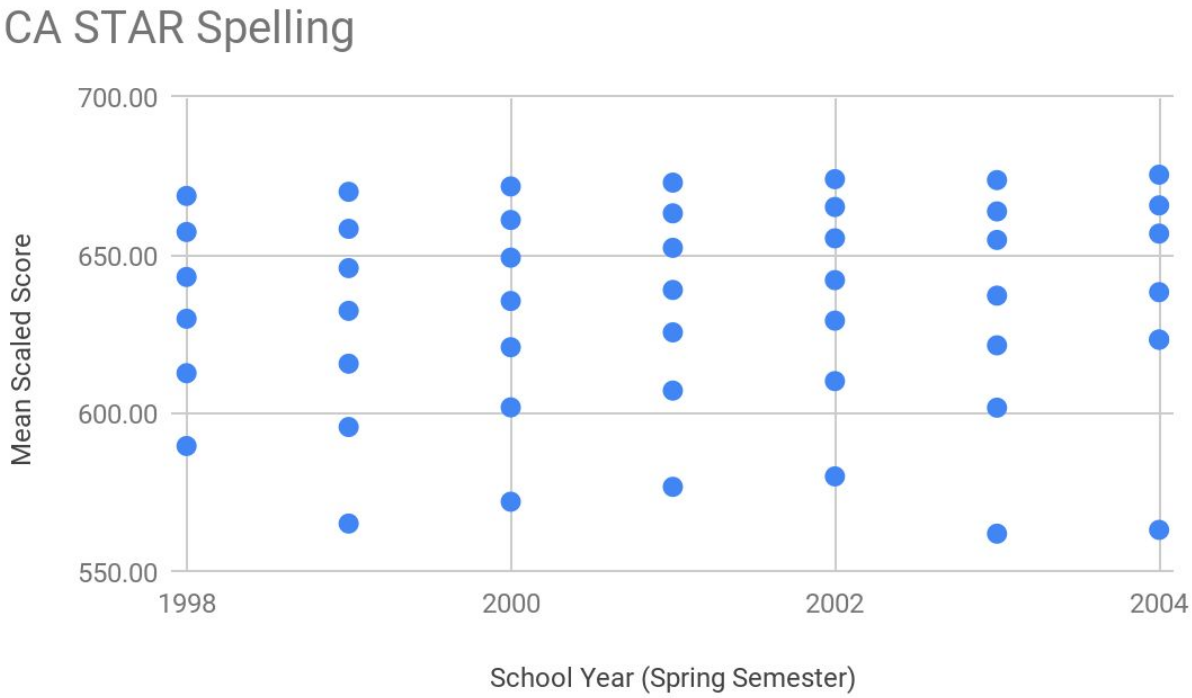
CA STAR Language Mean Scaled Score Descriptive Statistics

Mean	646.907
Median	653.45
Mode	666.5
Standard Deviation	28.686
Range	107.5
Minimum	581.2
Maximum	688.7
Sum	45283.5
Count	70
Largest	688.7
Smallest	581.2

Source: Data compiled and analyzed by author. All work is author's own.

Figure A.6 shows a scatter plot of all CA STAR test language mean scaled scores for all students in CA during the case study time period. We can see that there is a wide range of test scores until 2003, the end of the financial reform period. In 2003 and 2004, the plot begins to widen, contradictory to the other plots of test scores. This indicates that the reform did not impact math test scores as it did other testing categories. Likely, not enough resources were allocated to help students with language, or there was another extenuating circumstance that impacted the scores.

Figure A.7



Source:California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/00-00000-0000000.html.

Figure A.7.1

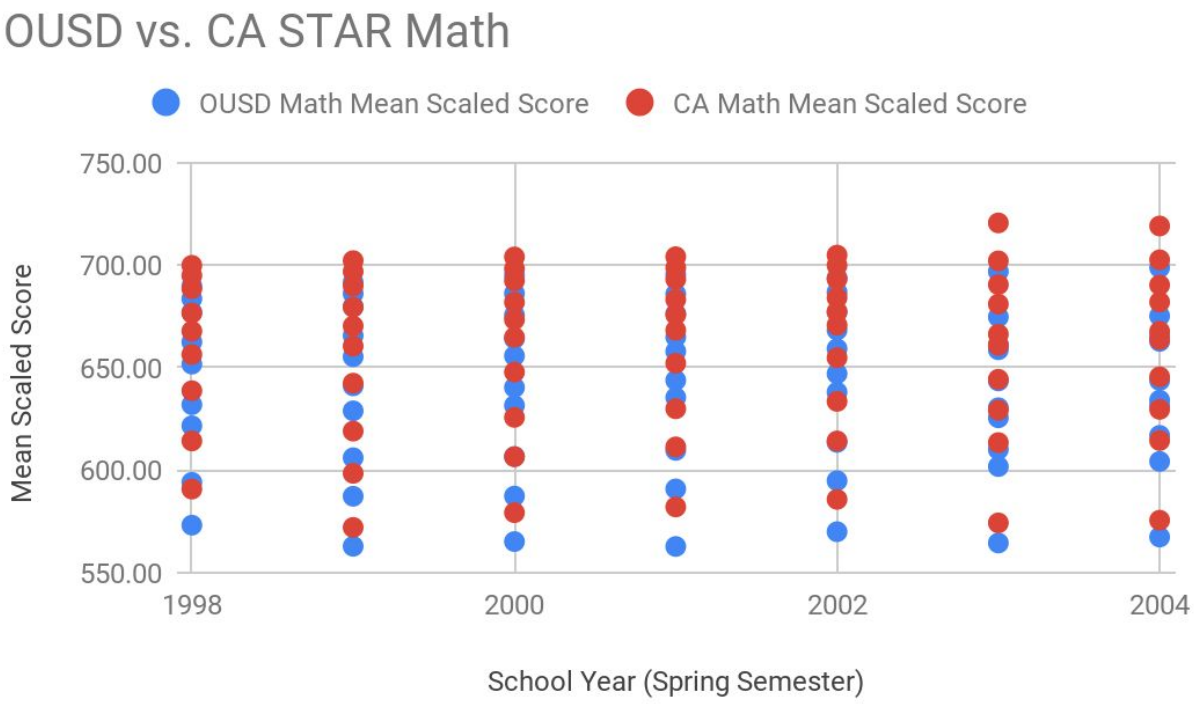
CA STAR Spelling Mean Scaled Score Descriptive Statistics

Mean	630.910
Median	637.3
Mode	623.4
Standard Deviation	34.332
Range	116.7
Minimum	558.8
Maximum	675.5
Sum	30914.6
Count	49
Largest	675.5
Smallest	558.8

Source: Data compiled and analyzed by author. All work is author's own.

Figure A.7 shows a scatter plot of all CA STAR test spelling mean scaled scores for all students in CA during the case study time period. We can see that there is a wide range of test scores until 2003, the end of the financial reform period. In 2003 and 2004, the plot begins to widen, contradictory to the other plots of test scores. In fact, in 2004, the range of test scores is greater than it was in 1998. This indicates that the reform did not impact spelling test scores as it did other testing categories. Likely, not enough resources were allocated to help students with math, or there was another extenuating circumstance that impacted the scores.

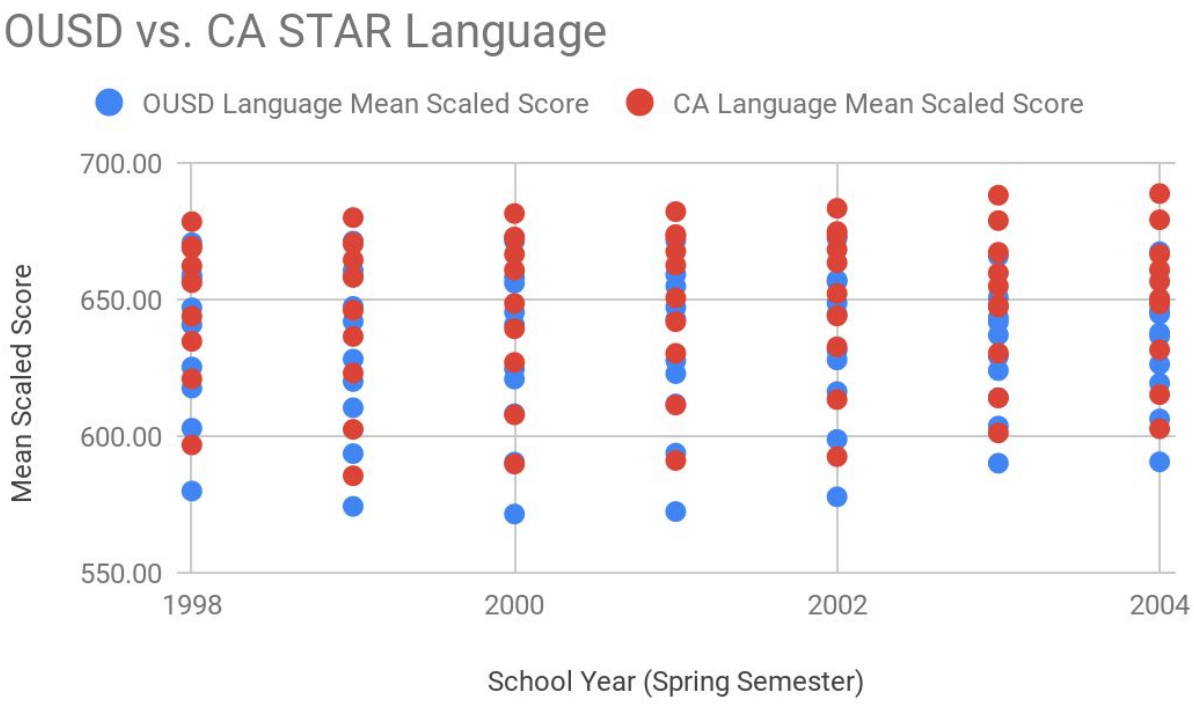
Figure A.8



Source: California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/01-61259-0000000.html.
Source:California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/00-00000-0000000.html.

Figure A.8 shows the OUSD STAR test math mean scaled scores and the CA STAR test math mean scaled scores. We can see that the OUSD scores tend to be lower than the California scores. Although the OUSD scores begin to narrow in 2003, the CA scores begin to widen. This indicates that OUSD's improvement in test scores is likely district related and not related to statewide trends.

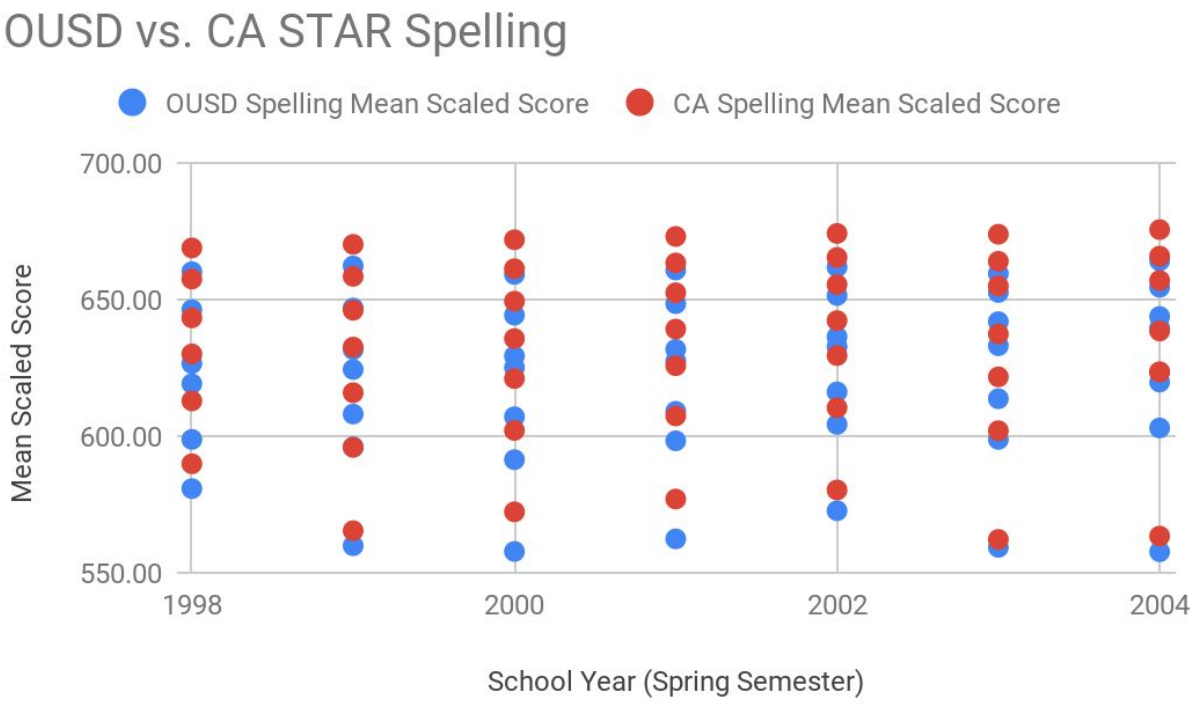
Figure A.9



Source: California Standardized Testing And Reporting (STAR) Program. https://star.cde.ca.gov/star98/reports/01-61259-0000000.html.
Source:California Standardized Testing And Reporting (STAR) Program. https://star.cde.ca.gov/star98/reports/00-00000-0000000.html.

Figure A.9 shows the OUSD STAR test language mean scaled scores and the CA STAR test language mean scaled scores. We can see that the OUSD scores tend to be lower than the California scores. Although the OUSD scores begin to narrow in 2003, the CA scores begin to widen. This indicates that OUSD's improvement in test scores is likely district related and not related to statewide trends.

Figure A.10



Source: California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/01-61259-0000000.html.
Source:California Standardized Testing And Reporting (STAR) Program.
https://star.cde.ca.gov/star98/reports/00-00000-0000000.html.

Figure A.10 shows the OUSD STAR test spelling mean scaled scores and the CA STAR test spelling mean scaled scores. We can see that the OUSD scores tend to be lower than the California scores. Although the OUSD scores begin to narrow in 2003, the CA scores begin to widen. This indicates that OUSD's improvement in test scores is likely district related and not related to statewide trends.