



IMPACT OF SOCIO-ECONOMIC FACTORS AT FCPS ELEMENTARY SCHOOLS

**Office of Research and
Strategic Improvement**

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FAIRFAX COUNTY PUBLIC SCHOOLS

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Introduction

In July 2013, the Office of Research and Strategic Improvement (ORSI; formerly OPE) released a study titled “Socio-Economic Tipping Point Study of Elementary Schools,” which examined the connection between overall school poverty and academic performance. This study was conducted in response to advisement by Joseph Murray, a nationally recognized expert on educational improvement, that one way to close achievement gaps in Fairfax County Public Schools (FCPS) might be for economically challenged students to attend schools with lower levels of similar students. That study which examined one year of data (SY 2011-12), had two important findings about the relation between the level of economically challenged students in a school and student achievement. First, similar to typical trends throughout the country, the study uncovered an inverse relation between schools’ level of economically challenged students and achievement: higher levels of economically challenged students were linked with lower reading and mathematics pass rates on standardized tests, while lower levels of economically challenged students were linked with higher pass rates. Second, at certain levels of enrollment of economically challenged students, reading and mathematics standardized test scores of individual students, regardless of their own economic status, were more impacted (positively or negatively, depending on the level). Several recommendations discussed in the original report, including reducing the level of economically challenged students and maximizing conditions in schools with higher levels of economically challenged students, were presented based on the findings of the original study.

Unfortunately, achievement gaps are still present in FCPS, so much so that FCPS committed to eliminating gaps as a focus of its current Strategic Plan. To support this effort and the work of the Strategic Plan, ORSI was tasked with conducting an updated version of the study. The results of this work, present analyses of data from the past five years (SYs 2013-14 thru 2017-18) toward the aim of providing current information to aid leadership in decision-making about how best to manage higher levels of economically challenged students within the division and, potentially, to inform criteria for boundary-setting.

Background

Schools’ capacity to produce high academic performance is attributed to numerous, coordinated factors, including teacher skills and instructional quality, student attendance, expectations from staff and parents, student retention, class size, and school size (Graber, 2009; “Teacher Quality,” 2005; “Primer: Education,” 2013). Attempting to focus on all of these areas may lead to a reduced ability to focus improvement and reduced capacity either through resources or staff burnout. Instead of focusing on all of these factors, it may be best that schools prioritize and address the most influential factors that affect schools’ ability to meet student performance expectations. One priority may be a reduction in adding more negative impacts to the school. For example, the focus of this report is on the effect of socio-economic factors on both school and individual student achievement. Thus, the purpose of this report is to understand whether reducing the cumulative amount of challenge in a school around this factor might reduce negative impacts on achievement.

The impact of economic challenge is well documented as one of the most influential factors affecting student achievement. Economic challenge can be defined in two different ways: (a) *individual student economic challenge* or whether a student is listed as a free-and reduced- meal recipient and (b) *school level of economic challenge* or the overall percentage of students at the school who are eligible for free- and reduced- meals. This study distinguishes between the two definitions because research shows that while having only a few economically challenged students presents challenges for those students, having high levels of economically challenged students presents challenges for the student and for schools in meeting state and federal performance standards, often leading to accreditation issues and low confidence from staff and community members that the school can fully carry out its educational mission and support strong academic performance by students.

Historically, the response has been to provide additional resources to individual schools based on the percentage of economically challenged students at the school. The intent has been to lessen the challenge faced by school-based staff in working with high numbers of economically challenged students. However, research has shown that schools with high levels of economically challenged students tend to exhibit

differences that go beyond the aggregate level of individual student economic challenge and are, consequently, not able to address student needs even with additional resources.

These differences (e.g., lower rates of teacher retention, more novice teachers, lower parent involvement, etc.) serve to act as counterweights to any resources channeled to these schools. Thus, the resources are often insufficient to raise achievement for FCPS schools with the highest levels of economic challenge. And, while there have been cases locally and nationally of schoolwide success with high levels of students with economic challenge who receive additional resources, the more common outcome has been schools still struggle to meet state and local schoolwide performance expectations. Alternatively, research showed that reducing high levels of economic challenge in schools not only bolsters student achievement and reduces discipline incidents but is also more cost-effective because fewer additional resources are needed at lower levels of economic challenge.

However, many schools throughout the nation do not serve economically diverse students. According to Kahlenberg (2012, 2019), while schools were pushed to desegregate racially starting in the 1950's, similar segregation still exists today, but is based on socio-economic status. Kahlenberg identifies the cause of the economic segregation as rooted in families who experience economic challenges voluntarily choosing to reside in neighborhoods with lower costs of living. He advocates for housing policies and government grants (such as funding for local efforts to reduce school segregation) to play a critical role in re-integrating schools. Kahlenberg (2012) outlines the research that shows that integration of economically challenged students will likely lead to greater achievement. For example, Schwartz (2010, 2012) found that students living in poverty demonstrated worse achievement when attending high-poverty schools than when attending schools with low concentrations of poverty. Additionally, Basile (2012) found that the return on investment (ROI) of integrating economically challenged students into schools to reduce the overall level of economic challenge yielded 5 times the amount spent on each student when looking at high school graduation rates, and ultimately lifetime earnings, tax payments, and demand on public services. He compared integration to lower class sizes and private voucher programs (school choice) and found the greatest ROI for integration.

ORSI's original study showed empirical evidence of "critical points" for elementary levels of economic challenge in FCPS (i.e., a level of students who are economically challenged at which success is statistically unlikely). In other words, although the needs of individual economically challenged students do not change simply because there are fewer of them at a single school, schools with high levels of economic challenge were statistically more likely to have lower achievement, above and beyond the negative effects of individual economic challenge. Students that are not economically challenged in schools with high levels of economic challenge perform lower than their counterparts in schools with low levels of economic challenge. This shows that there is a collective impact of poverty that goes beyond the individual economically challenged students. The likely reason for this evidence is that schools reach a maximum capacity where they are no longer able to meet the needs of their students. The purpose of the current report is to determine trends in FCPS' ability to meet the needs of students, particularly in schools with higher levels of economically challenged students.

Therefore, the following research questions will be addressed:

1. *What, if any, school level enrollment of economically challenged students is associated with the capacity for FCPS schools to meet academic performance expectations?*
2. *What is the typical impact on students attending schools with higher levels of economically challenged students?*

Findings

School Pass Rates on Reading and Mathematics SOLs

Study Question 1: What, if any, school level enrollment of economically challenged students is associated with the capacity for FCPS schools to meet academic performance expectations?

Study question 1 addressed whether trends exist over the past five years in how the level of economic challenge and schools' ability to meet accreditation standards on reading and mathematics SOLs are linked. The basic concern behind this question was whether reaching a certain level of economic challenge reduces the likelihood of school success. Underlying this concern is the notion that at a certain point schools may be either overly burdened or spread too thin in attending to the needs of students to be successful in having their students meet reading and mathematics standards and, thus, the school itself may be unable to achieve benchmarked levels of performance.

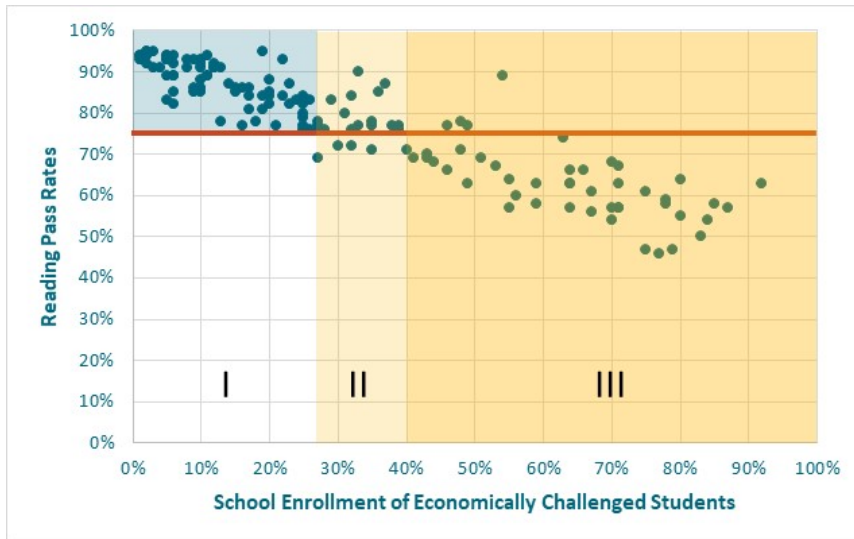
Finding 1: Over the last five years, when FCPS elementary schools reached approximately 40 to 50 percent (or higher) economically challenged students, they were unlikely to meet the accreditation benchmark level in reading.

Across all 5 years of data, there was a clear link between the level of economic challenge and school pass rates in reading and mathematics. This means that greater levels of economic challenge in a school were associated with lower pass rates. More information on the correlations can be found in Appendix A. Data were graphically examined to show the associations between economic challenge and pass rates. Additionally, graphs show the levels of economic challenge where success is less likely. Across the five years, reading pass rates fell into three zones. Figure 1 depicts the relation between reading pass rates for schools (on the vertical axis) and the overall level of economic challenge at a school (on the horizontal axis) in 2017-18. Each dot in the graph represents one FCPS elementary school. The red line at 75 percent helps identify those schools meeting reading accreditation expectations (above the line) and those that did not (below the line).¹ Zone I shows enrollment levels of economically challenged students where all school pass rates are above the accreditation benchmark level. Zone II indicates enrollment levels where most schools are above the benchmark but some are below, while Zone III indicates FRM enrollment levels where most schools are below the benchmark.

Figure 1 shows that in SY 2017-18, when schools had levels of economic challenge that were less than 30 percent, they were statistically likely to meet accreditation and when schools had levels of economic challenge that were greater than 45 percent, they were statistically unlikely to meet accreditation expectations. Similar patterns emerged across the five years of data with three distinct zones for reading, although at different levels of economic challenge. Across the five years, schools were extremely likely to meet accreditation standards for reading if the level of economic challenge were below 25 to 35 percent, and were likely to struggle at levels of economic challenge above 40 to 50 percent. (For graphs showing SY 2013-14 through SY 2016-17 data, see Appendix A.) Additionally, similar patterns existed in the original study, albeit at different levels of economic challenge. The original study showed that schools with levels of economic challenges below 20 percent were most likely to succeed and schools with levels of economic challenge above 45 percent were most likely to struggle.

¹ While Figures 1 and 2 depict benchmarked accreditation levels of school performance, schools can achieve accreditation standards through other means not depicted in the figures. That is, many of the schools represented by a dot falling below the red line met accreditation standards in reading or mathematics by making accepted levels of progress or through other available options.

Figure 1: SY 2017-18 Level of Economic Challenge and Reading Pass Rates at FCPS Elementary Schools



Finding 2: Over the last five years, the relation between elementary school level of economic challenge and performance on mathematics varied considerably, ranging from approximately 40 to 65 percent before schools became unlikely to meet accreditation benchmark levels of performance.

The pattern for mathematics performance and economic challenge is less clear. Still, two consistent zones of economic challenge emerged across the five years. Zone I represents the level of economic challenge where schools are likely to meet accreditation standards. Zone II represents the level of economic challenge where schools are less likely to meet accreditation standards. Levels of economic challenge that fell into Zone II did not indicate that schools were unable to meet expectations, just that it was statistically less likely. Figure 2 depicts the relation between mathematics pass rates for schools (on the vertical axis) and the overall level of economic challenge at a school (on the horizontal axis) in 2017-18. Each diamond in the graph represents one FCPS elementary school. The red line at 70 percent helps identify those schools meeting mathematics accreditation expectations.

Figure 2: SY 2017-18 Level of Economic Challenge and Mathematics Pass Rates at FCPS Elementary Schools

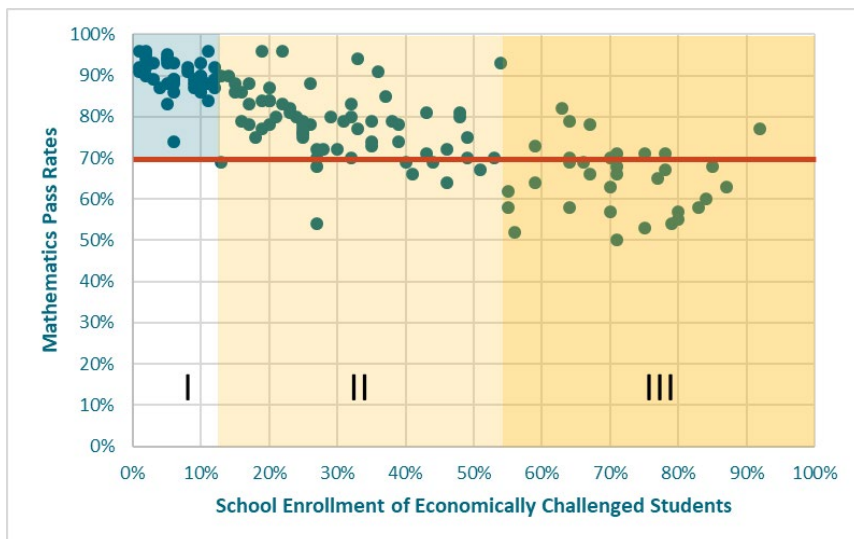


Figure 2 shows that in SY 2017-18, schools with levels of economic challenge at 45 percent or fewer were more likely to meet accreditation standards in mathematics, whereas schools with level of economic challenge greater than 45 percent were less likely. In Figure 2, exceptions to the general trend are also represented, indicating that certain schools do not follow the pattern.

Students Attending FCPS Schools with Higher Levels of Economic Challenge

Study Question 2: What is the typical impact on students attending schools with higher levels of economically challenged students?

This study also sought to address individual students' performance in schools with higher levels of economic challenge. Essentially, this question is meant to signify critical points of economic challenge with respect to how individual students achieve within schools. This question addresses the idea that FCPS would like to ensure that all students have the same opportunity to achieve, regardless of which school they attend.

Specifically, analyses for this question sought answers to whether a student attending one FCPS elementary school with a high level of economic challenge would have had a different level of achievement had that same student attended an elementary school with a low level of economic challenge. And, if so, what would be different about that student's achievement in the schools with the different levels of economic challenge? For example, do economically challenged children attending schools with overall low levels of economic challenge outperform their counterparts at schools with overall high levels of economic challenge?

Finding 3: Generally, school-level economic challenge, above and beyond an individual student's economic status contributed to a decrease in SOL scores.

Results showed that schools' level of economic challenge, separately from individual student economic challenge, contributed to differences in students' SOL performance in reading and mathematics: across the years (SY2015-16 through SY2017-18), level of economic challenge was associated with an average decrease of 8 to 23 scale score points on the reading SOL and an average decrease of 5 to 25 scale score points on the SOL mathematics test. Therefore, the findings indicate that in FCPS elementary schools level of economic challenge has a dual effect on student achievement, both at the individual student level, and collectively at a school. Additionally, both students with economic challenges and those without showed decreases in scores when they attended schools with higher overall levels of economic challenge. This finding matches that of the original 2013 study conducted in FCPS.

Finding 4: Beyond the generally downward trend in performance, students demonstrate lower performance on both reading and mathematics tests when a school's level of economic challenge reaches 10 percent or greater.

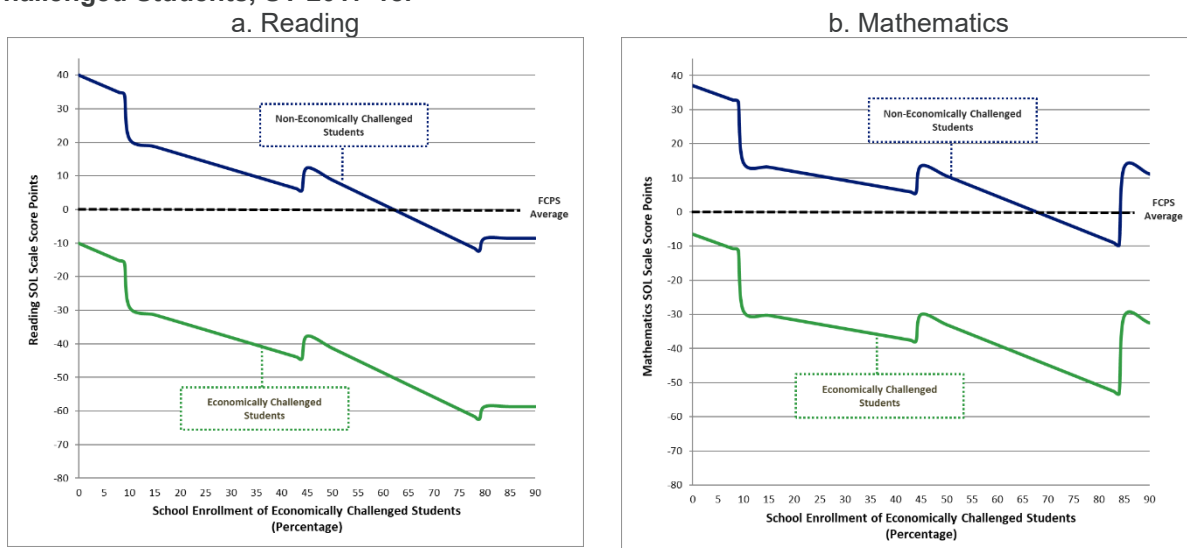
In SYs 2015-16 through 2017-18, a critical point was identified at 10 percent of students with economic challenge for reading and mathematics performance (see Figure 3). Schools with greater than 10 percent of students with economic challenge reflected an acceleration of the overall downward trend in student scores. This means that student scores decreased at a greater rate at 10 percent or greater enrollment of economically challenged students than the overall downward trend. For instance, in addition to lower scores generally, students in schools with greater than 10 percent of students with economic challenge had a 7 to 10 point decrease in their reading performance. This means that schools with levels of economic challenge above 10 percent had students who were not as successful in reading and mathematics performance, compared to schools with levels of economic challenge below 10 percent. Importantly, this finding applied to all students, regardless of economic status. Thus, both students with and without economic challenge at the same school demonstrate similar declines in their reading and mathematics performance when attending schools with levels of economic challenge above the 10 percent critical point.

Finding 5: Students attending schools with levels of economic challenge of 45 percent or higher demonstrate a slowing of the downward trend.

A critical point was also identified at 45 percent of students with economic challenge showing a deceleration of the overall downward trend in student scores. This finding is the opposite of the 10 percent critical point. This finding does not mean that students enrolled in schools with levels of economic challenge at 45 to 50 percent or greater perform better than schools with levels of economic challenge less than 45 to 50 percent. Rather, it means that students attending schools with levels of economic challenge greater than 45 to 50 percent did not show further decreases compared to the overall downward trend. For instance, students in schools with levels of economic challenge above 45 percent received approximately 11 to 13 additional points in reading performance.

A similar pattern existed in SY 2011-12, except that the initial critical point was 20 percent. Interestingly, the economic challenge critical point is on average lower compared to SY 2011-12, meaning that although the average school level of economic challenge was 26 percent in SY2011-12, compared to 28 to 33 percent in the past five years, the critical point did not increase. This finding could indicate that even with lower levels of economic challenge in FCPS schools, meeting performance expectations are more challenging than before. [For additional details on the hierarchical linear modeling analyses supporting the findings for this question, see Appendix A.]

Figure 3: Student SOL Performance in Schools with Different Enrollments of Economically Challenged Students, SY 2017-18.



Conclusions

- Overall, the results of the original 2013 study were largely replicated though the specific points at which school-level economic challenge impacted school and student success shifted slightly. There is consistency in findings throughout multiple years of data, indicating that many FCPS schools with high enrollment levels of economically challenged students (approximately 40 percent or more) continue to have difficulty meeting expected reading and mathematics pass rate benchmarks. Therefore, the additional resources that FCPS provides to meet the challenges these schools face may be helping but are not fully addressing the challenges.
- As was found in the 2013 study, the same FCPS student, whether living in poverty or not, is likely to have greater success on the reading and mathematics SOLs when the school the student attends has a low enrollment of economically challenged students. The critical point evidence from this study indicates that the same student attending one of the 32 FCPS elementary schools with economic challenge levels below 10 percent would have higher reading and mathematics

achievement than that same student attending an FCPS school with an economic challenge level that rises above 10 percent. More specifically, the shift was approximately 50 SOL scales score points for a student attending an FCPS school with the lowest enrollment of economically challenged students to a school with the highest enrollment.

- Reducing enrollment of economically challenged students at all FCPS elementary schools to less than 10 percent is not a feasible goal since the average enrollment of economically challenged students in FCPS is approximately 33 percent. However, a goal of having less than 40 percent enrollment of economically-challenges students, which is the level where most FCPS elementary schools were able to successfully reach benchmarked pass rates, is feasible. For some schools, this critical point of overall school economic challenge may mean the difference between being viewed as successful or not, which highlights the potential importance of controlling school levels of economic challenge as much as possible.
- Students who are not economically-challenged are, on average, performing around the Division mean or higher, while economically challenged students, on average, perform from 10 to 60 points below the Division mean. This disparity in overall performance between economically challenged students and non-economically challenged students exists even in FCPS elementary schools with low enrollment of economically challenged students. Thus, it appears just as important for FCPS to address the needs of individual students whose families face economic challenges as to create conditions that allow schools to be successful.

Recommendations

1. Focus reading and mathematics support and intervention efforts on all economically challenged students, regardless of which school the student attends.
2. Strive to maintain school levels of economically challenged students at less than 40 percent, whenever possible.
3. Continue to work with Fairfax County partners, including through One Fairfax, to coordinate efforts to support neighborhoods and schools that are socio-economically diverse.
4. In situations where changes to the level of students facing economic challenges cannot be reduced, select or develop school-based staff who are specially trained to work in these challenging situations.

Appendix A Additional Details on Analyses

Data and Sample:

The purpose of this report was to examine whether trends exist in the association between school level of economic challenge and achievement overall for schools and for individual students. The data used to investigate these relations covered the last five school years with data (SY 2013-14 through SY 2017-18).

Measures:

The following measures were used in the study:

- Student Economic Challenge: Data from student membership were used to determine individual students' FRM status. Students receiving free or reduced-cost meals were designated as economically challenged students.
- School Economic Challenge: The percentage of students with economic was calculated for each school by taking the count of the students with FRM status divided by the total number of students in the school.
- School Achievement: Reading and Mathematics SOL pass rates were used to determine achievement for schools.
- Student Achievement: Reading and Mathematics scale scores were used to determine individual students' achievement.

Measures and Analysis Plan:

The study investigated two questions:

1. *What, if any, level of economic challenge is associated with FCPS schools' capacity to meet academic performance expectations?*
2. *What is the typical impact on students attending schools with higher levels of economically challenged students?*

To address the first research question, the first step was to examine the data in order to learn if there was a relation between school economic challenge and school achievement. Data were first checked to determine the normality and homogeneity of the data. Next, correlational analyses were performed to understand whether a significant linear relation existed between the two factors. Finally, we computed transformed variables and included them in regression analyses to capture any nonlinear trends that would reflect a tipping point.

Normality:

Our sample sizes for all three measures were approximately 140 cases. We performed the *Shapiro-Wilk* test to determine whether these three measures were normally distributed. As can be seen in Table C-1, our school level measure of economic challenge and both student achievement measures had non-normal distributions ($p < .001$). This finding influenced what statistic we would use when running correlational analyses, since it indicated nonparametric analysis would be most appropriate.

Table C-1: Description of the data

| Year | Measure | n | Mean | SD | Shapiro-Wilk Test | Sig. |
|------------|-----------------------------|--------|-------|------|-------------------|------|
| SY 2013-14 | School Economic Challenge | 141 | 30% | 23% | 0.92 | *** |
| | Reading Pass Rates | 141 | 77% | 12% | 0.95 | *** |
| | Mathematics Pass Rates | 141 | 79% | 12% | 0.91 | *** |
| | Reading SOL scale score | 42,838 | 452.9 | 72.6 | N/A | |
| | Mathematics SOL scale score | 41,251 | 461.2 | 68.0 | N/A | |
| SY 2014-15 | School Economic Challenge | 139 | 28% | 22% | 0.92 | *** |
| | Reading Pass Rates | 139 | 82% | 10% | 0.96 | *** |
| | Mathematics Pass Rates | 139 | 83% | 10% | 0.90 | *** |
| | Reading SOL scale score | 43,719 | 455.9 | 71.5 | N/A | |
| | Mathematics SOL scale score | 42,140 | 467.8 | 70.9 | N/A | |
| SY 2015-16 | School Economic Challenge | 144 | 33% | 26% | 0.92 | *** |
| | Reading Pass Rates | 144 | 79% | 13% | 0.91 | *** |
| | Mathematics Pass Rates | 144 | 80% | 14% | 0.84 | *** |
| | Reading SOL scale score | 52,408 | 458.6 | 72.1 | N/A | |
| | Mathematics SOL scale score | 54,786 | 455.7 | 73.4 | N/A | |
| SY 2016-17 | School Economic Challenge | 144 | 33% | 26% | 0.91 | *** |
| | Reading Pass Rates | 144 | 79% | 13% | 0.92 | *** |
| | Mathematics Pass Rates | 144 | 79% | 13% | 0.90 | *** |
| | Reading SOL scale score | 55,554 | 455.0 | 74.0 | N/A | |
| | Mathematics SOL scale score | 53,405 | 455.5 | 74.9 | N/A | |
| SY 2017-18 | School Economic Challenge | 144 | 33% | 25% | 0.92 | *** |
| | Reading Pass Rates | 144 | 78% | 13% | 0.93 | *** |
| | Mathematics Pass Rates | 144 | 77% | 12% | 0.91 | *** |
| | Reading SOL scale score | 53,943 | 448.1 | 75.2 | N/A | |
| | Mathematics SOL scale score | 49,384 | 448.1 | 73.9 | N/A | |

Correlations

Correlations measure the linear relation between two variables. The most common correlation measure used is a Pearson's r ; however, Pearson's r assumes that both variables are distributed normally (Field, 2005). Since all three of our measures were non-normally distributed, we measured correlations by calculating the Kendall's τ statistic, which rank orders the variables and examines the concordance and discordance among these rankings. Kendall's τ also has several benefits over other correlation measures, such as Spearman's r , including better measurement for small datasets and improved estimates of the population (Gibbons, 1993). Values for correlations can range between +1.00 and -1.00, with values close to zero representing no relation, and values close to positive or negative 1 indicating perfect correspondence of one score with another score.

Across all five school years, there were statistically significant negative, moderate correlations that indicate that a higher level of school economic challenge is associated with lower overall achievement for schools. This matches what is typically found throughout the United States, meaning FCPS elementary schools match the pattern seen elsewhere. Table C-2 presents the correlations between school economic challenge and student achievement in reading and mathematics. Generally, the pattern was found to be stronger between school economic challenge and reading performance, than school economic challenge and mathematics performance. Nonetheless the relation of school level economic challenge to overall school achievement (pass rates) would be classified as a large effect across all five years for both reading and mathematics. Additionally, over the five year time span, the correlation grew larger, indicated

increasing association between a school's level of enrollment of economically challenged students and reading and mathematics SOL pass rates.

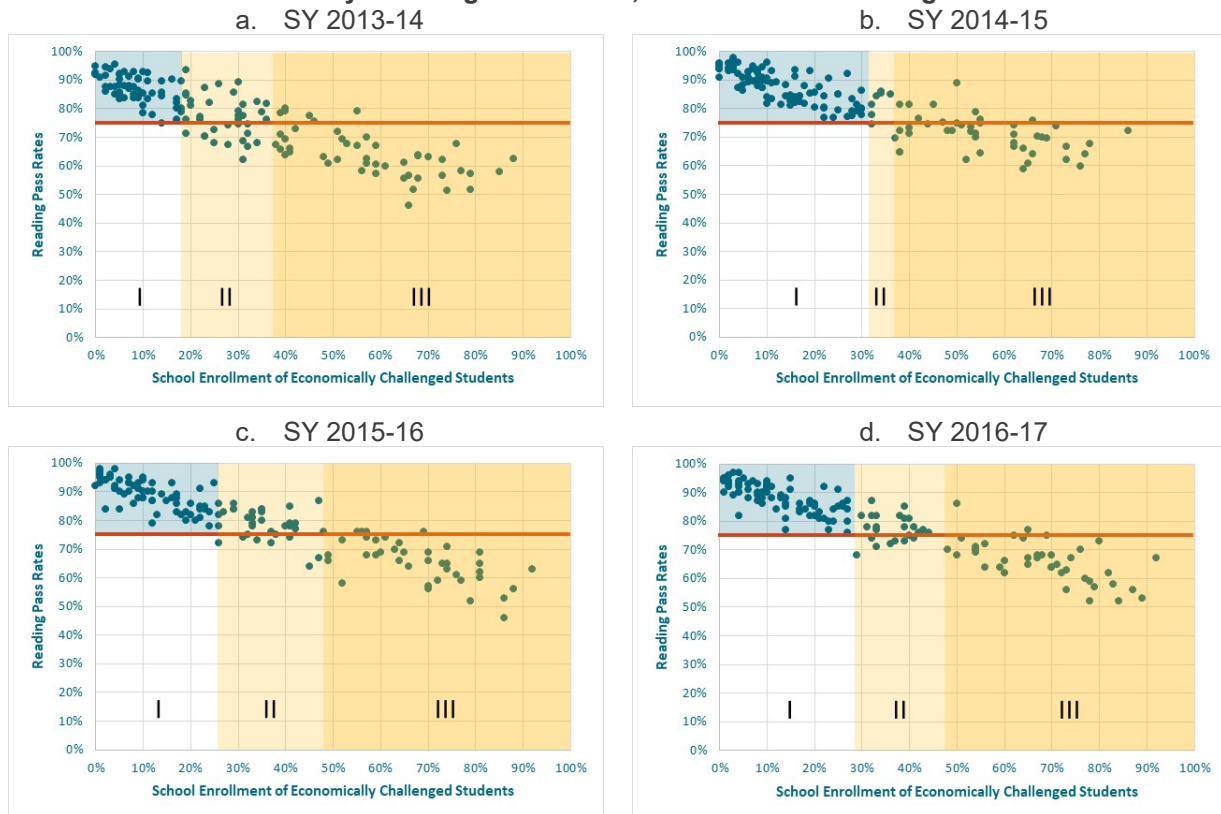
Table C-2: Correlations between level of school economic challenge and student achievement

| Year | Reading | | Mathematics | |
|------------|---------------|--------------|---------------|--------------|
| | Kendall's Tau | Significance | Kendall's Tau | Significance |
| SY 2013-14 | -.579 | *** | -.525 | *** |
| SY 2014-15 | -.692 | *** | -.580 | *** |
| SY 2015-16 | -.703 | *** | -.635 | *** |
| SY 2016-17 | -.750 | *** | -.670 | *** |
| SY 2017-18 | -.739 | *** | -.628 | *** |

*** $p < .001$

Figure C-1 is a graph of school achievement in reading (SOL pass rate) as a function of school-level of enrollment of economically challenged students. Each dot in the figure represents one FCPS elementary school and positions it in the graph with respect to level of enrollment of economically challenged students (horizontal axis) and pass rates on the reading SOL. Figure C-2 is similar to Figure C-1 but shows student-level achievement in mathematics as a function of school enrollment of economically challenged students. Both figures depict the linear relation between the two measures (which was quantified by the significant Kendall's *Tau* values).

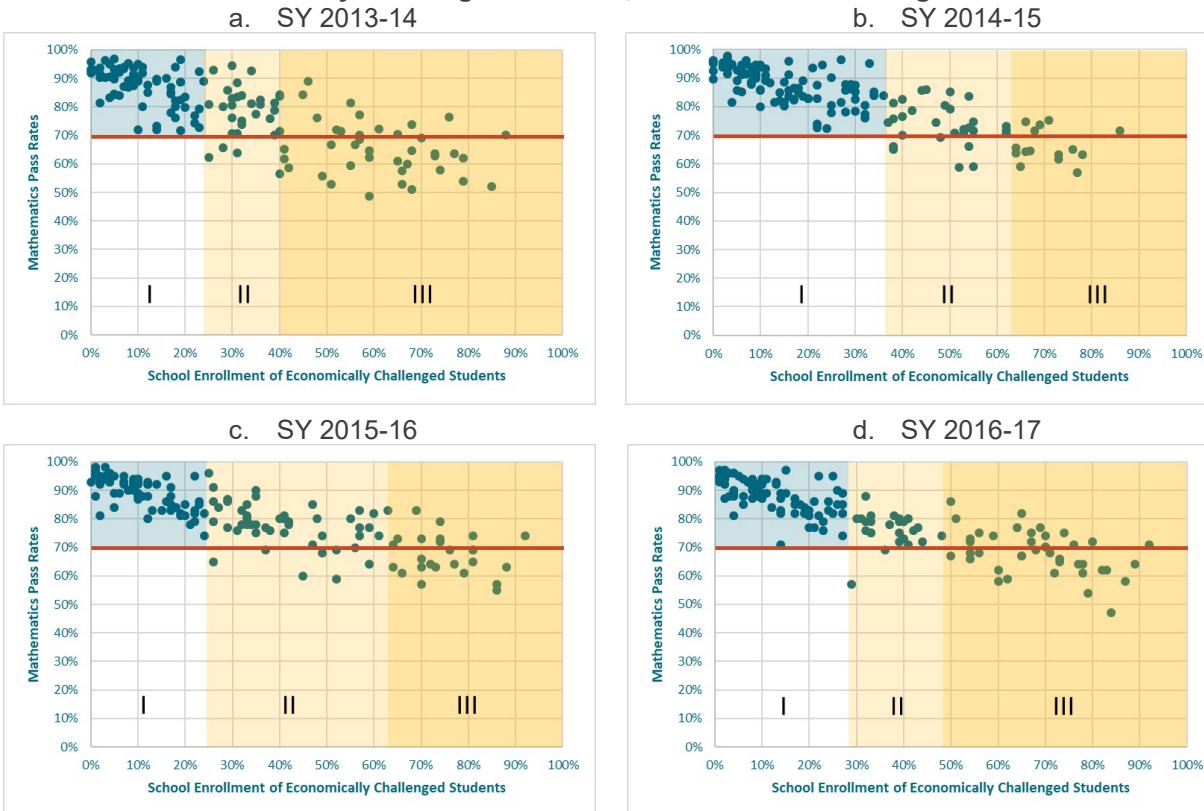
Figure C-1: Scatterplots of School Reading Pass Rate and School Enrollment of Economically Challenged Students, SYs SY 2013-14 through 2016-17



Visual inspection of the scatterplots in Figures C-1 and C-2 also indicate three zones. Zone 1 depicts a range of school enrollment of economically challenged students where all schools exceed the accreditation

benchmarks on reading and mathematics set by the Virginia Department of Education.² Zone II (light gold) highlights the level of enrollment of economically challenged students where the majority of schools continue to exceed accreditation benchmarks. Zone III (darker gold) highlights the enrollment levels of economically challenged students where the majority of schools fall below expected levels of performance.

Figure C-2: Scatterplots of School Mathematics Pass Rate and School Enrollment of Economically Challenged Students, SYs SY 2013-14 through 2016-17



Hierarchical Linear Models (HLM)

This section brings together the information from the student-level and school-level datasets in multilevel models designed to assess the different socio-economic factors that influenced a student’s achievement in math and reading.

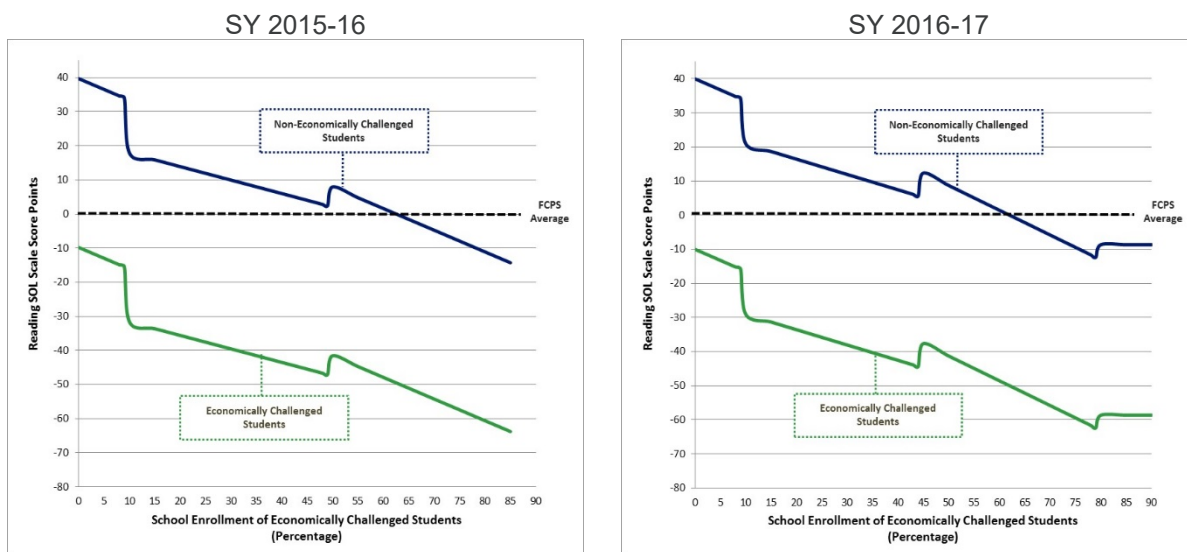
Reading Achievement Models

Across all the reading achievement models, the student economic challenge measure was a strong and consistent predictor of student achievement in reading exam scores. Specifically, economically challenged students scored approximately 50 scale score points lower on the reading SOL than non-economically challenged students across all five years investigated in the study. Additionally, the economic challenge level of a school was a consistent predictor of reading achievement models. That is, the level of economically challenged students in a school accounted for half an SOL scale score point (range of .4 to .7) for every percentage point increase in a school’s level of enrollment of economically challenged students. In 2017-18, schools in FCPS had an average of 33 percent of students with economic challenge, which translates into a score that is approximately 16.5 scale score points lower (range of 13 to 23 points) for the average FCPS school.

² While Figures C-1 and C-2 depict benchmarked accreditation levels of school performance, schools can achieve accreditation standards through other means not depicted in the figures. That is, many of the schools represented by a dot falling below the red line met accreditation standards in reading or mathematics by making accepted levels of progress or through other available options

From SY 2015-16 through SY 2017-18, there was evidence of consistent critical points in the reading models. For students who attended schools in which levels of economic challenge were greater than 10 percent, these students scored roughly 7 to 10 scale score points lower on the SOL than their peers who attended a school with levels of economic challenge below 10 percent. Additionally, students who attended schools with significantly more economic challenge (45 to 50 percent) were more likely to receive slightly better test scores than would be expected based on the downward trend line for increasing school levels of economic challenge. Lastly, the final year of data examined in this study (SY 2017-18), indicated a new critical point where schools with more than 85 percent enrollment of economically challenged students demonstrated another increase from the typical downward trend, amounting to 4 scale score points. This finding is likely due to a floor effect, meaning that students in schools with higher levels of economic challenge performed worse than their peers only until a certain point. Also, it should be noted that in prior years there may have been too few elementary schools in FCPS to have this final critical point emerge from the data. Figure C-3 shows the trend line and the critical points in school level enrollment of economically challenged students for reading achievement in Sys 2015-16 and 2016-17.

Figure C-3: Model of Student Reading Performance in Schools with Different Levels of Economic Challenge, SYs 2015-16 and 2016-17

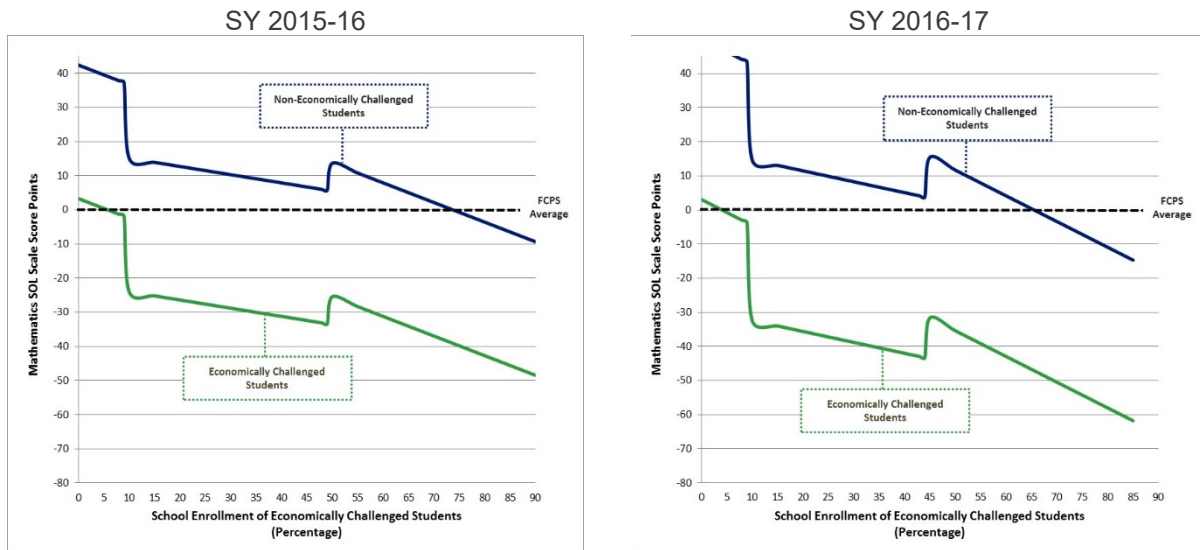


Mathematics Achievement Models

Across all the mathematics achievement models, the student economic challenge measure was a strong and consistent predictor of student achievement in SOL mathematics scores. Specifically, economically challenged students scored approximately 45 scale score points lower on the reading SOL than non-economically challenged students across all five years investigated in the study. Additionally, the school level of economic challenge was a consistent predictor of mathematics achievement. That is, the level of economically challenged students in a school accounted for more than half a SOL scale score point (range of .4 to .8) for every percentage point increase in a school's level of enrollment of economically challenged students. In 2017-18, schools in FCPS had an average of 33 percent of students with economic challenge, which translates into a score that is approximately 17 scale score points lower (range of 13 to 26 points) for the average FCPS school.

From SY 2015-16 through SY 2017-18, there were evidence of consistent critical points in the mathematics models. For students who attended schools in which levels of economic challenge were greater than 10 percent, these students scored roughly 11 to 25 points lower than their peers who attended a school with levels of economic challenge less than 10 percent. Additionally, students who attended schools with significantly more economic challenge (at or above 45 to 50 percent) were more likely to receive slightly better test scores than would be expected based on the downward trend line. Figure C-4 shows the trend line and the critical points in school level enrollment of economically challenged students for reading achievement.

Figure C-4: Model of Student Mathematics Performance in Schools with Different Levels of Economic Challenge, SYs 2015-16 and 2016-17



Appendix B

References

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