History of SAT Scores for FCPS Schools **Report FAC/FCA-149**

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Introduction: There is much controversy about evaluating school systems, in part because student SAT performance depends, on average, on ethnicity[1]. As the ethnic mix changes, the average scores change. The purpose of this report is to present the history of SAT scores for the FCPS system for each of the four racial groups delineated by the FCPS system to determine if changes in the racial mix explain the positive changes in the SAT scores. First, however, we examine the change in the percent of the students who take the SAT.

Summary: The FCPS SAT scores have increased over the years 2006 to 2013 for each of the four racial groups[2] (Exhibit 1). During this same time, the national scores for the four races decreased, except for a small increase for Asians. We looked herein only at the changes in scores, not the fact that FCPS scores consistently exceed the national scores.

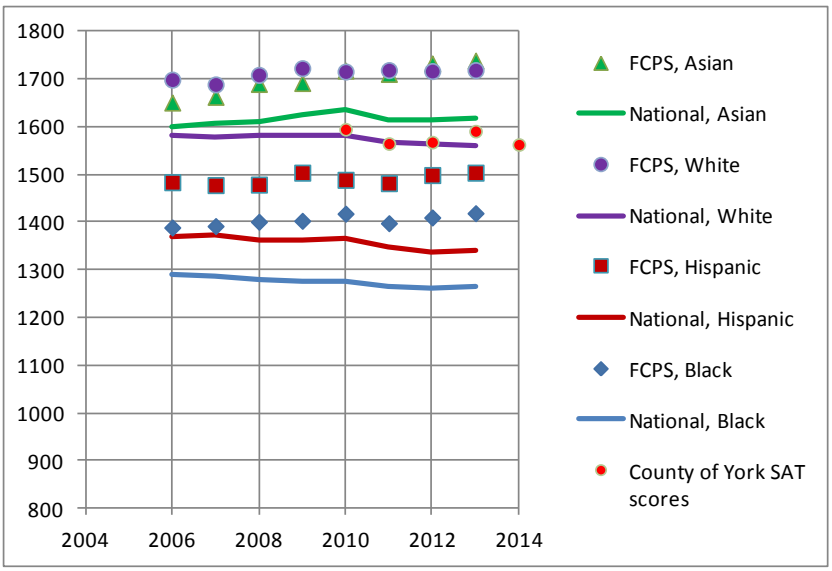

Exhibit 1: History of the FCPS Sat Scores and National SAT Scores

The total increase in FCPS scores, the sum of the Reading, Math, and Writing scores, can be explained in part by the change in the number of students taking the test (Exhibit 2). The percent of students taking the SAT has decreased. If those not taking the SAT are the lowest performing students, the decrease in the number taking the test can account for 80% of the increase in SAT scores (32 points out of the 40-point increase). The remaining 8 points can be explained by the changes in racial mix. These two causes for changes in SAT scores imply that the students are scoring the same today (2013) as they did in 2000.

The two factors we studied have a logical bearing on the test scores; therefore, the hypothesis that these are the causes is reasonable. However, we must keep in mind that correlation does not mean causation.

[1] Report 133: SAT Performance for FRM and ESOL Students
[2] The data for the curves presented herein is contained in the Excel file for Report 141.

Discussion: The trend line shows that SAT scores of FCPS students have increased by approximately 40 points over the years from FY2000 to FY2013 (Exhibit 2). Although we would like to attribute the increase to better teaching, the increase might have been due to changes in the racial composition of the graduating seniors or due to fewer low-performance students taking the test.

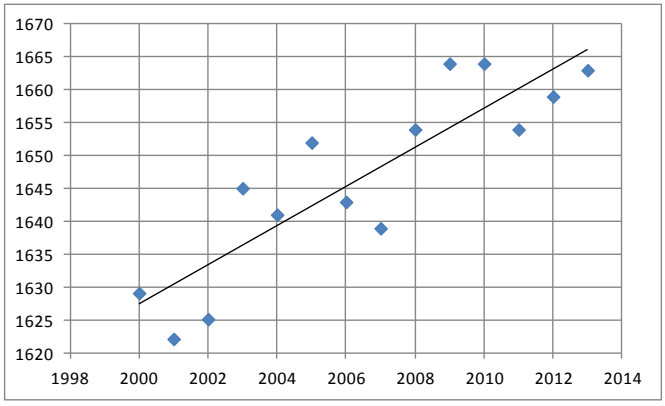

Exhibit 2: History of Average SAT Scores

We look first at the scores as a function of the percent taking the test. Indeed, the percent of the students taking the test has decreased over the years (Exhibit 3). If we assume that the percent not taking the SAT are the lowest performing students, the average SAT would increase. To estimate the effect of a lower percentage taking the test, we assumed a normal distribution of SAT scores as if all students took the test. The standard deviation was reported as 110[3]. A least squares regression analysis of the actual scores vs. percent of students taking the test implies that the mean score would be 1612, if all students took the test. With this mean and standard deviation, we computed the average score as a function of the percent of students who took the test (Exhibit 4). The trend line shows that the increase over the years, as corrected for the percent of students taking the test, is only 8 points, as compared to the 40 of Exhibit 2.

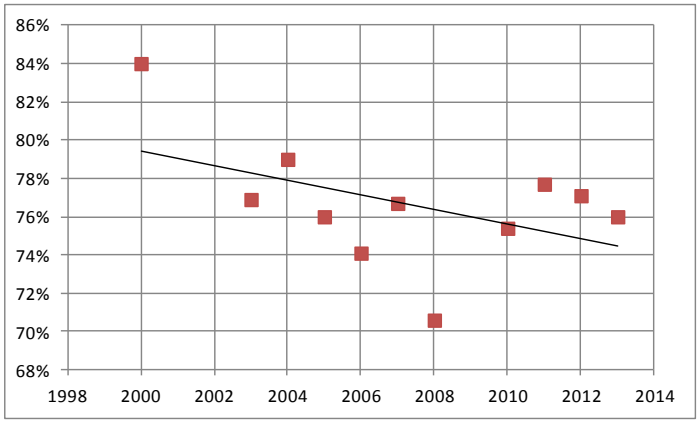

Exhibit 3: History of the Percent of Students Who Took the SAT

We look next at the ethnic composition of the students attending FCPS schools. The change has been significant (Exhibit 5). The percent of whites has decreased 19%, while the percent of Hispanics has increased 12% and Asians, 4%. The percent of Blacks remained almost constant. (The balance was categorized as "other" racial designations.) We do not know the percentage of each racial category that took the SAT; therefore, we cannot apply the same correction procedure to the racial scores as used above. The uncorrected scores show that the

[3] http://research.collegeboard.org/programs/sat/data/cb-seniors-2014

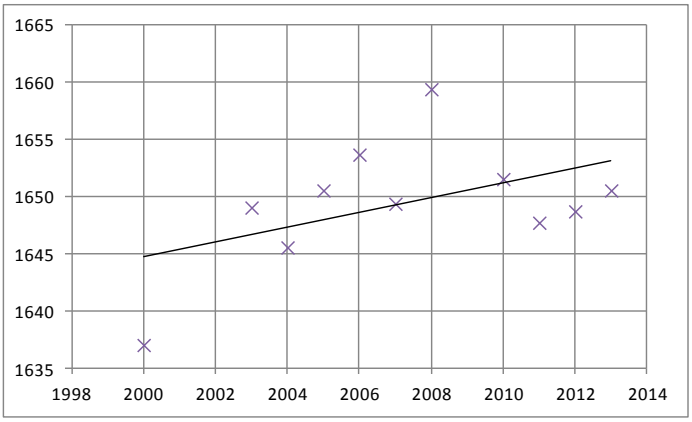

Exhibit 4: History of Average SAT Scores as Corrected for the Percent of Students Taking the Test

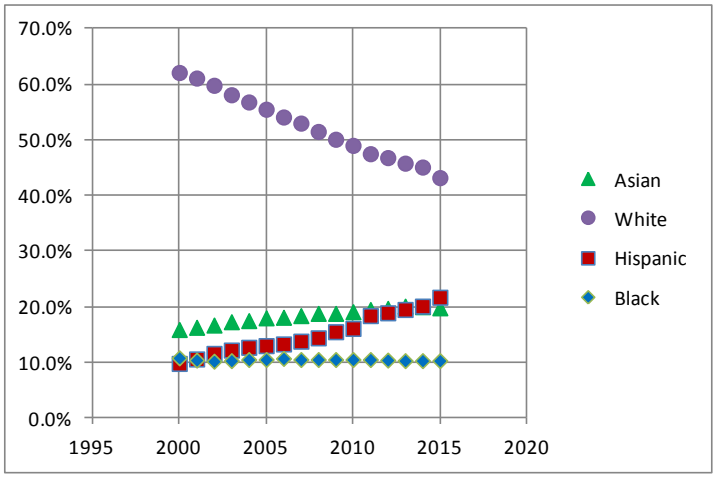

Exhibit 6: Changes in the Racial Composition of the FCPS Student Body

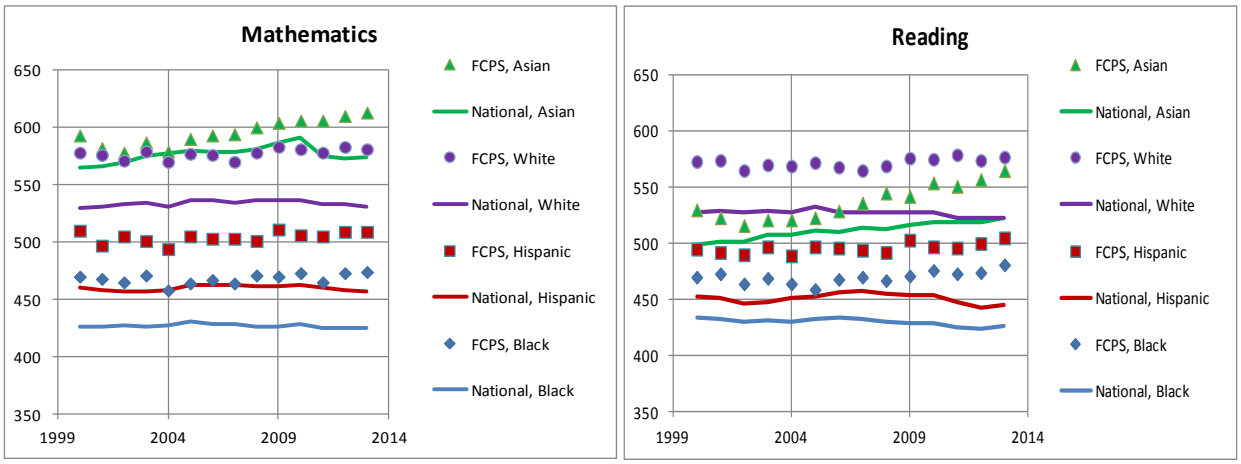

Exhibit 5: History of SAT Mathematics and Reading Scores for the Four Races

averages for the races are highest for Asian and lowest for Black (Exhibit 6). The graphs show clearly that the Asians have improved the most. The increasing number of Asian students and the increasing scores by the Asians certainly contributed to the increase in FCPS SAT scores.

The average annual increases in SAT scores, not corrected for percent participation, show that FCPS students improved in every category, but especially relative to the national averages. For example, FCPS Blacks gained 0.8 points per year in Reading, but 1.4 points relative to the national average for Blacks (Exhibit 7). These are annual gains, so over the past 10 years, the FCPS blacks increased their scores 14 points relative to the national average for Blacks. In Reading and Writing, the gap between Black and White performance narrowed, but the gap widened in Mathematics. The decrease in many of the national averages implies that the test did not become increasingly easier.

FCPS	Reading	Math	Writing
Years	2000-2013	2000-2013	2006-2013
Asian	3.4	2.4	5.1
Black	0.8	0.4	1.1
Hispanic	0.7	0.5	0.7
White	0.5	0.6	0.8
National	Reading	Math	Writing
Years	2000-2013	2000-2013	2006-2013
Asian	1.8	0.9	1.5
Black	-0.6	-0.1	-2.5
Hispanic	-0.3	0.1	-2.2
White	-0.4	0.2	-1.8

Exhibit 7: Average Increase in SAT Scores per Year for FCPS Students and for Students Nationally

The correlation coefficients between the racial groups are above 0.9, except for the Blacks; therefore, the scores can be correlated with any one of Asian, Hispanic, or White. For the Blacks, for which the variation is small, there is almost no correlation between Blacks and the SAT scores. The change in the White percentage explains 40 points in Reading and 30 points in Math. The change in the Asian percentage does the same.

It seems, therefore, that the 8 points that remain after correcting for the number of test takers can be explained by the change in the racial composition of the student body.

Comparison among the trends (Exhibit 7) shows that the gap between the Asians and the Whites is increasing substantially in all three subject areas. The other gaps are not changing much.