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How Much Has Moving to the Suburbs Increased African American Educational Opportunities?

By John F. Kain and Daniel M. O'Brien

Introduction

After several decades of little or no change, America's persistent and stubborn pattern of black-white racial segregation has exhibited some decline (Farley and Frey, 1993). One important consequence has been increased access by African American children to "higher quality" suburban schools, which Kain and Persky (1969) suggested nearly 30 years ago would be a major benefit of increased black access to suburban housing markets. This decline has been particularly notable in southern and western metropolitan areas and black suburbanization is particularly pronounced in Texas metropolitan areas. Because of a history of extensive African American participation in Texas agriculture, particularly cotton cultivation, the suburban rings of several Texas metropolitan areas have long had significant black populations. More recently, overbuilding and the collapse of petroleum prices made individual homeowners and landlords less sensitive to skin color and have contributed to rapid suburbanization of black households during the most recent decades.

In this paper we use micro panel data from the Texas Schools Data Base (TSDB) to examine three questions: (1) How much black suburbanization occurred between 1990 and 1996; (2) Are the suburban schools, where growing numbers of black children are enrolled, of higher quality than inner city schools in the same metropolitan area; and (3) Has the increased access to "higher quality" suburban schools had a positive effect on the performance of black children on standardized tests?

The paper begins with a description of TSDB and the student cohort that is used in the analysis. After examining mean differences in student performance by race/ethnic group, we consider the extent of black suburbanization. Then using regression techniques, we develop three measures of school quality for more than 5,000 campuses. Using these school quality measures, we then consider whether suburban schools in large metropolitan areas are in fact “better” than schools in the principal inner city districts. These campus level school quality measures are included in regressions of individual achievement for black students enrolled in public schools in Texas’ five largest metropolitan areas in grades three through seven. Finally, using estimates of school quality for the average suburban and average inner city school for each grade, we provide a provisional answer to the question of whether African Americans benefit from increased access to better suburban schools.

The Texas Schools Data Base

TSDB includes up to seven years of panel data for more than two million students and more than 350,000 teachers as well as extensive data for nearly 6,000 campuses and more than 1,000 districts for the same seven year period. This spring we will add an eighth year. The student data, which are the basis of the analyses presented in this paper, are for five cohorts of students beginning in 1990 (we follow the convention of identifying the 1989-90 school year as 1990) through 1996. The youngest of these cohorts were in pre-K and the oldest in the 3rd grade in 1990. The analysis starts with 1990 because the Texas Education Agency (TEA) implemented its PEIMS (Public Education Information Management System) system in that year.[1] TSDB also contains 26 years/grades of standardized test data for three different standardized tests that were administered by TEA during this period.

Sample and Cohort Definition

This analysis is based principally on student data for the 3rd of our cohorts. For purposes

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[1] PEIMS is a yearly relational data base and TEA makes no effort to link these data across years. To construct TSDB, we had to combine annual PEIMS teacher and student data with TEAMS, TAAS, NAPT, and various teacher certification tests that are not part of PEIMS and link these data across years. To create TSDB we had to combine data from more than 140 individual student files and more than 110 individual teacher files, as well as campus level data from TEA’s AEIS files, block group data from the 1990 Census and district level data from the School District Data Book CD ROMs. The number of individual records

of this paper, this cohort includes all students who were enrolled in the 3rd grade in 1992 plus those who were enrolled in Texas public schools in at least one of the following additional grades/years: 1/1990, 2/1991, 4/1993, 5/1994, 6/1995 and 7/1996. We centered the cohort definition on the 3rd grade because it was the earliest grade in which a statewide-standardized test was given. By defining the cohort in this way we maximized the number of records with both 3rd grade and subsequent year tests while including those students who were retained in grade or double promoted in the remaining years. In all, 387,236 children were members of this cohort in one or more years. The numbers by grade and year are given in Table 1. As these data reveal, significant numbers of students migrated to or from other cohorts over the seven-year period. As the

Table 1. All Students in Sample by Grade and Year

Grade	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
-1	47						
0	376	483					
1	**260,101**	2,929					
2	11,093	**268,843**		713			
3	187	4,391	**279,476**	5,931	463		
4				**275,234**	8,546	365	
5				1,249	**275,689**	10,328	375
6				619	1,532	**275,293**	14,381
7					366	2,003	**272,179**
8						233	2,424
9							208
Total	271,804	276,646	279,476	283,746	286,596	288,222	289,567
Off-Diagonal	4.3%	2.8%	0.0%	3.0%	3.8%	4.5%	6.0%

bottom row indicates, in 1996, out-of-cohort members of the sample were six percent of the total number of students who were in our sample in that year. This fraction in 1992 was zero by construction.

Enrollment in any one year ranged from a low of 271,804 in 1990 to a high of 289,567 in 1996. These panel data reflect several types of sample attrition. In each year, significant numbers of students transfer to Texas public schools from schools in other states and countries and from private schools within Texas. Regrettably, TEA does not collect data on the origins of these transfer students, a weakness of their data collection that needlessly complicates the tasks of linking and of interpreting annual student records

included in TSDB exceeds 80 million.

across years. In each year, these enrollment gains are partially offset by the movement of students to schools outside of the state or to private schools. It would be more difficult to determine the destinations of these out-migrants, but, if they could be obtained, this information would also be highly useful in assessing the extent and nature of sample attrition.

TEA employs elaborate error checking procedures in an effort to insure that a single, unique ID number in PEIMS identifies students enrolled in Texas public schools. In spite of these efforts, an unknown number of these "unique" students have multiple IDs and appear in our data base as more than one student. An unknown amount of the "apparent" attrition is attributable to these students.[2] Dropouts are another potential source of sample attrition. Because the oldest students are in the 7th grade, however, most are required to attend school. As our cohorts age, dropouts will become more important. TEA collects data on dropouts that we could use to assess this problem; but we have not obtained them as yet. Nonetheless, we are confident that very little of the attrition for the current sample is attributable to dropouts.

As Appendix Table A-1 shows, we have seven years of data for 52.8 percent of the students included in this analysis. Adding those in the sample for either five or six years increases the fraction to 67.1 percent. These fractions, which are slightly higher for African Americans, undoubtedly overstate sample attrition. In this paper, we use individual student data from the center cohort of the data base and student scores from the Texas Assessment of Academic Skills (TAAS), a criterion referenced test, which was administered in grades three through seven during the 1992 through 1996 school years.[3]

Math and Reading Performance by Race/Ethnicity and Grade

Before considering the extent and nature of black suburbanization, we pause briefly to

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[2] In an effort to further assess this problem, we plan to ask TEA to use students names, which are unavailable to us for reasons of confidentiality, to assess how many of the African Americans in this cohort with incomplete histories are the same students. In most instances, multiple IDs are associated with moves from one district to another.

[3] In addition to TAAS, we also have two years of individual student data for NAPT (Normed-referenced Assessment Program for Texas), which was given in the 3rd and 4th grades. As its name indicates, NAPT is a norm-referenced test; we do not use these data in this paper, however.

consider how the performance of African Americans in reading and math compares to that of other race/ethnicity groups in Texas. As the mean test scores in Table 2 reveal, African Americans, with mean z scores between .31 and .49 of a standard deviation below the statewide average for all students, have the lowest scores of any of the five-race/ethnic groups in every grade in both reading and math. Hispanics also perform poorly on these tests; their z scores, which are higher than African Americans in both reading and math for all grades, nonetheless lag far behind the remaining three race/ethnic groups. These data also support the widely held perception that Asian Americans are currently America's highest performing students. They have the highest mean scores on both tests in every grade and, again, conforming to the stereotype, their advantage is particularly large in math.

As noted previously, significant fractions of students who were enrolled in Texas schools when TAAS was given do not have test scores, either because they missed the test or because their tests were not scored. As the bottom panel of Table 2 reveals, the percentages of students without scores varies widely across racial/ethnic groups and grades. Hispanics, many of whom arrive at school with limited English language skills have the highest no-score rates for both tests in every grade. As these data indicate, these rates vary from a high of 24 percent for 5th grade reading to a low of 15 percent for 7th grade reading and math. Most of the Hispanic students without TAAS scores have been excused from taking TAAS because of an LEP (Limited English Proficiency) exemption. If these excused LEP students were required to take the English language versions of TAAS, the mean scores for Hispanics would be much lower.

No-score rates for Native Americans, Asian Americans and African Americans are similar and substantially below the Hispanic rates, while those for Anglos (non-Hispanic whites) on both tests and in every grade are much lower than those for any of the remaining four groups. The higher no-score rates of Hispanics and Asians, of course, reflect the large number of LEP excuses given to them. Hardly any Anglos or African Americans are LEP; in this cohort only one percent of blacks and 0.9 percent of Anglos were ever classified as LEP. The fractions for Hispanics and Asians are 47 percent and 43 percent. Finally, five percent of Native Americans were classified as ever LEP. In spite of the fact that the LEP fractions for Asians are nearly as high as those for

Hispanics, their no-score rates are much lower. Asian no-score rates, however, are considerably higher than those of Anglos, a fact which should be kept in mind when assessing mean scores.

Given the high fractions of Hispanic children who are excused from or do not take strongly related to their low achievement. At the same time, there are important differences that argue for separate and distinct analyses of the two groups. For this reason, we plan to use data from TSDB in a subsequent extensive study of Hispanic students and the causes of their low achievement.

In contrast to Texas blacks, which include few recent immigrants from non-English speaking nations, the number of recent immigrants from Spanish speaking countries is large and growing. A very large fraction of the children of these immigrant groups arrive at school with few English language skills and limited oral vocabularies in either Spanish or English. While we are agnostic on the issue, many critics argue that well intentioned, but mistaken, bilingual education programs that offer these children little, or no, instruction in English in the early grades insure that the initial disadvantages of Hispanic children from non-English speaking backgrounds will persist (Farkas 1996 and 1997). Some support for this position is provided by surveys of bilingual education programs that conclude that, at best, bilingual programs do no better than English immersion programs in developing competency in English (Cziko, 1992; Rossell and Baker, 1996).[4] What impresses us about bilingual education programs in Texas, however, is that they differ greatly and that no one really knows what actually goes on in bilingual classrooms. There exists no systematic information on such fundamental questions as the amount of English versus Spanish language instruction in various subjects and grades. As we note above, we plan to consider these issues in subsequent research.

Long lags and the persistent impacts of slavery, decades of separate and unequal black schools in the South, and more recent patterns of racial segregation in both northern and southern metropolitan areas appear to be central to the low achievement of blacks

[4] Rossell and Baker (1996, p. 1-2) in a review of 300 program evaluations of bilingual programs observe that, “Bilingual education as it is practiced in the public schools of the United States means teaching non-English speaking students in their native tongue, and gradually transitioning them to English over a period of several years.” They note further “that the avowed goal” of bilingual education, which they contend “its supporters have not disputed, is to transition non-English speaking students from their native tongue to English and to produce the highest possible achievement both in the English class itself and in other subjects.” Their evaluation of these programs indicates that “transitional bilingual education (TBE) is never better than structured immersion, a special program for limited English proficient children where the children are in a self-contained classroom composed solely of English learners, but the instruction is in English at a pace they can understand.” Finally, they, conclude that “the research evidence does not support transitional bilingual education as a superior form of instruction for limited English proficient children.”

(Anderson, 1988; Card and Kruger, 1992; Kain, 1992; Margo, 1990). While Hispanics have experienced discrimination in both labor and housing markets, they were not enslaved, were not required by law to attend vastly inferior, separate schools and their residential segregation is not, and never has been, as great as those of African Americans (Farely and Frey, 1993; Massey and Denton, 1993). In contrast to Hispanics, where housing market discrimination and segregation are, we suspect, relatively unimportant contributors to their achievement gap, the intense and persistent segregation of African Americans may be a major reason for their low achievement. Texas offers a particularly promising setting to assess its role and to consider how much black Americans in other parts of the country could expect to benefit from increased access to higher quality suburban schools.

The Extent of Black Suburbanization

Table 3, which documents the extent of black suburbanization in 1990 and 1996 for the cohort used in this analysis, illustrates several important points. First, in spite of the fact that large numbers of Texas blacks were employed in agriculture, two thirds of all black children belonging to this cohort attended public schools in one of the state's five largest metropolitan areas in 1996.

Second, in a pattern that is dramatically different from northern cities, by 1996, more black children in this cohort attend public schools in suburban districts of the state's five largest metropolitan areas than are enrolled in the principal central-city district in each metropolitan area.[5] As a fraction of the total black enrollment in the five largest PMSAs, 52 percent of black children went to suburban schools and 48 percent were enrolled in one of the five inner city districts. This result is not an artifact of this cohort. If Spring 1996 attendance data for all five cohorts are used, 51 percent of black children living in

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[5] Texas school districts are not conterminous with either city or county boundaries. As a result, the residents of its central cities frequently attend more than one district. San Antonio is the most extreme case. Confronted by this problem we have designated the most "inner-city" of these districts the central city district for each metropolitan area. Similarly we have classified all other districts within the metropolitan area as "suburban" even though many of them are more small town or rural than "suburban." Of course, given the rapid growth of the state's metropolitan areas most of these districts are becoming "suburban."

the state’s five largest PMSAs attend suburban schools. The substantial concentrations of

Table 3. Black Enrollment in Inner City and Suburban Districts and Selected Other Types of Districts in 1990 and 1996

Areas in 1990	Large Metropolitan Areas in 1996: Houston Sub	Houston IC	Dallas Sub	Dallas IC	Fort Worth Sub	Fort Worth IC	San Antonio Sub	San Antonio IC	Austin Sub	Austin IC	Small Meto Area in 1996 Sub	Small Meto Area in 1996 IC	Rest of State	Out of Sample	Total
Housub	3,831	404	18	6	6	2	8	2	3	8	10	53	89	1,017	5,457
HouISD	1,148	3,643	8	4	2	2	6	1	6	4	2	64	59	997	5,946
Dalsub	13	7	2,059	230	59	15	3	0	5	2	9	22	51	574	3,049
DISD	14	14	755	3,545	41	12	1	1	0	4	7	25	63	593	5,075
FtWorth	7	1	34	12	491	64	4	0	2	0	0	11	13	182	821
FtWISD	3	2	16	15	215	1,412	3	2	1	4	1	9	24	296	2,003
SanAnt	9	6	5	2	2	0	534	57	3	7	4	9	12	273	923
SAISD	5	3	3	1	1	0	139	366	5	1	2	6	7	93	632
Austin	4	1	3	0	4	4	1	3	299	44	1	7	3	66	440
AustISD	7	6	9	4	4	1	3	1	95	686	4	13	14	119	966
SmMetSub	12	6	8	3	4	2	4	1	3	8	1,018	117	27	282	1,495
SmMetIC	87	39	48	34	23	19	20	2	10	30	174	4,039	133	1,070	5,728
NonMetro	85	51	74	62	18	23	5	7	8	14	52	196	5,226	561	6,382
Out of sample	1,386	787	986	684	377	338	393	59	113	143	331	1,157	648	8,958	
Enrollment															
1996	6,611	4,970	4,026	4,602	1,247	1,894	1,124	502	553	955	1,615	5,728	6,369		40,196
1990	5,457	5,946	3,049	5,075	821	2,003	923	632	440	966	1,495	5,728	6,382		38,917
Difference:															
Number	1,154	-976	977	-473	426	-109	201	-130	113	-11	120	0	-13		1,279
Percentage	21.1%	-16.4%	32.0%	-9.3%	51.9%	-5.4%	21.8%	-20.6%	25.7%	-1.1%	8.0%	0.0%	-0.2%		3.3%
Shares of Total Enrollment															
1996	16.4%	12.4%	10.0%	11.4%	3.1%	4.7%	2.8%	1.2%	1.4%	2.4%	4.0%	14.3%	15.8%		100.0%
1990	14.0%	15.3%	7.8%	13.0%	2.1%	5.1%	2.4%	1.6%	1.1%	2.5%	3.8%	14.7%	16.4%		100.0%

black students in suburban school districts are a legacy of Texas’ role as a major cotton producer and the heavy participation of first black slaves and then freedmen in its cultivation. Large numbers of blacks lived in the agricultural communities surrounding the central cities of what have become large metropolitan areas and significant numbers remained as these areas were converted from agricultural to urban use. Before Texas schools were desegregated following Brown, the children of these black families attended all-black schools. Since the schools in these communities were desegregated, they have attended integrated schools, although they tend to be concentrated in a few schools within each district.

Third, the number of black children attending school in the suburban districts of large Texas metropolitan areas increased by 27 percent during this seven year period, while enrollment in the inner city districts of the same five metropolitan areas declined by 12 percent. Finally, it should be noted that nearly 9,000 of the approximately 57,000 black members of this cohort were not enrolled in any Texas public school in either 1990 or 1996.

Tables 4 and 5 present further information on black suburbanization in Texas’ largest metropolitan areas. In contrast to the cohort numbers in Table 3, these data are based on PEIMS enrollment data for African American children attending grades 3-7 in 1996. They are a snapshot, which give the number of children attending each campus on a single Fall day. As the data in Table 4 reveal, there are 207 "suburban" districts in the five largest PMSAs. The double quotes refer to previously mentioned facts that Texas school districts are not coterminous with cities and towns and that a number of these suburban districts serve some inner city residents. The pattern is especially pronounced in San Antonio, where a number of "suburban" districts serve significant portions of the inner city, albeit portions that are more suburban in character than the area served by San Antonio ISD, the district we designate as "the" inner city district.

Table 4. Number of Suburban Districts by Black Enrollment in 1996 by PMSA (All Five Cohorts, Grades 3-7).

	Number of Suburban Districts					
Black Enrollment	Houston	Dallas	Fort Worth	San Antonio	Austin	Total
0	1	6	7		2	16
0-25	5	32	13	9	12	71
26-100	9	14	7	7	5	42
101-250	10	5	4	4	6	29
251-500	4	3	3	1	2	13
501-1000	5	10	1		1	17
1001-2000	5	4		3		12
2000+	4	2	1			7
Total	43	76	36	24	28	207

The number of suburban districts varies greatly across the five PMSAs. Dallas PMSA, with 76 suburban districts, has the most and San Antonio, with 24 suburban districts, has the least. If the Dallas-Ft. Worth CMSA is viewed as a single entity, it has two inner city districts and 112 suburban districts. Table 4 also reveals that only 16 of the 207 suburban districts, including seven in the Forth Worth PMSA and six in the Dallas PMSA had no black 3rd to 7th graders. At the opposite extreme, seven of the 207 suburban districts had more than 2,000 black 3rd to 7th graders in 1996 and 12 had between one and two thousand.

Table 5 gives the shares of black enrollment in grades 3-7 in 1996 for inner city and suburban districts classified by black enrollment size. The last column, which contains these shares for all five PMSAs combined, reveals that half of all 3rd to 7th grade black students attending school in these PMSAs in 1996 were enrolled in inner city schools and half were enrolled in suburban schools. Examination of row one reveals that a minority of San Antonio and Houston black students enrolled in these grades in 1996 attended inner city schools while in the other three districts, a majority were enrolled in inner city schools. The extremes are San Antonio where only 30 percent of black students attended San Antonio ISD campuses and Austin where 66 percent attended Austin ISD campuses.

Table 5. Share of PMSA Black Enrollment in Grades 3-7 (all five cohorts)in the Inner City and in Suburban Districts by Number of Blacks Enrolled in 1996

	Percent of All Students Who Are African American					
Black Enollment	Houston	Dallas	Fort Worth	San Antonio	Austin	All
Central City	44%	55%	61%	30%	66%	50%
Suburbs by Number of Blacks Enrolled						
0-25	0%	1%	1%	1%	1%	0%
26-100	1%	2%	2%	5%	5%	2%
101-250	3%	2%	4%	8%	12%	4%
251-500	2%	2%	7%	4%	9%	3%
501-1000	6%	16%	5%		7%	9%
1001-2000	12%	12%		52%		12%
2000+	31%	11%	20%			19%
All	100%	100%	100%	100%	100%	100%

These share data also demonstrate that the four Houston suburban districts with more than 2,000 black students enrolled 31 percent of the PMSA's black students. If the 1,000 black students cutoff is used, this number becomes 43 percent. The single Fort Worth suburban district with more than 2,000 black students, Arlington ISD, enrolls 20 percent of the PMSA's black 3rd to 7th grade students in 1996. None of the Fort Worth PMSA suburban districts have between one and two thousand black 3rd to 7th graders. The Dallas PMSA has 16 districts with at least 500 3rd to 7th graders in 1996; in combination, these 16 suburban districts account for 39 percent of the PMSA's 3rd to 7th graders.

Are Suburban Schools Better than Inner City Schools?

Having established that large numbers of black children attend suburban schools in Texas' largest metropolitan areas and that this number is rapidly increasing, we now consider whether suburban schools are better than inner city schools. This question is difficult to answer, primarily because there is very little agreement about what constitutes a "better" school. Like similar analyses, we use standardized test data in an effort to quantify school quality. Specifically, we develop the following three measures for each campus.

(1) Unadjusted mean z scores for reading and math for each campus.

(2) Level adjusted mean z scores. These are differences in actual and predicted mean z scores for reading and math for each campus, obtained from campus fixed effects regressions of reading/math scores on individual student characteristics.

(3) Value added adjusted z scores. These are differences in actual and predicted mean z scores for reading and math for each campus, obtained from campus fixed effects regressions of reading/math scores on individual student characteristics and the previous year's reading/math score.

As indicated above all three school quality measures are derived from z scores for each year/grade. Z scores are simply the ratio of the deviation of the number of correct answers for each student from the mean number of correct answers for all students with meaningful scores to the standard deviations of all students' scores. Use of z scores makes comparisons across tests with different numbers of questions possible and sidesteps most questions relating to norm referencing or to the differential level of difficulty of tests given in different years to different grades. The z score for each student indicates how well he/she did on a particular test relative to the average performance of all students taking the same test in the same year. We calculate campus means of each of these school quality measures both for all students and for each of the five race/ethnicity categories.

There is supposed to be a test booklet/record for every student that is enrolled at a particular campus on the day the test is given.[6] Significant numbers of students, however, are excused from taking TAAS in each year. The tests of "excused" students are not supposed to be scored, but a fair number have values for the number of correct answers. For the analyses included in this paper, we exclude all students who were excused from the tests and those who were not excused but had zero correct answers. We exclude students/tests with zero right answers because their number is implausibly large.

Between 10 and 15 percent of students with test booklets fail to take the test or their tests were not scored. In addition, nearly 12,500 Hispanic children (5.1 percent of all 3rd graders) took a Spanish language version of the 3rd grade test. Table 6 gives the total numbers of test records, the numbers included in the analysis, and the numbers excluded from the reading portion of TAAS by reason and by grade. The numbers for the math portion, which are not shown, are nearly identical.

As the bottom panel reveals, the most common reasons for not taking the test are an ARD (Special Education) exemption followed by an LEP exemption. As a fraction of total test records, ARD exemptions reach a maximum of 7.7 percent in the 5th grade before declining to 5.1 percent in the 7th grade. The fraction of LEP exemptions is lowest in the 3rd grade, when it is less than one percent because Hispanic LEP students have a Spanish language alternative available to them. LEP exemptions in the following year, when there is no Spanish language option, increase to four percent of all test booklets. This exemption rate peaks at five percent in the 5th grade and then declines, although it is still 2.6 percent in the 7th grade.

Between 1.2 and 2.0 percent of all students scheduled to take the test in each year are

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[6] It is possible that there are students who are enrolled at the time the test is given, but who did not take it and do not have test booklets/records. It is impossible to assess the extent of this problem for the first three years of our data because the enrollment data for these years are a snapshot and identify only those children in attendance on a particular day in the Fall. For the final four years we have attendance data that should include all students who were ever in attendance at a particular campus and indicate whether they were in attendance during a six-week period that includes the date the test was given. These data may enable us to assess whether there are missing test booklets/records for students who did not take the test, but were in attendance. We have still not finished linking these attendance data to the tests, however, and are uncertain about how feasible these comparisons may be.

absent the day the test is given. It has been suggested that some teachers/schools encourage students who they expect to do poorly on TAAS to stay home on the day of

Table 6. Sample Composition by Grade for All Students

Categories	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
Total Observations					
Number	255,522	267,442	267,811	269,759	265,311
Percentages					
All	100.0%	100.0%	100.0%	100.0%	100.0%
English	94.9%	100.0%	100.0%	100.0%	100.0%
Spanish	5.1%				
Used in Regressions					
English	87.4%	85.1%	85.5%	87.7%	90.4%
Spanish	4.9%				
Exemptions					
Special Education	5.9%	7.4%	7.7%	7.0%	5.1%
LEP	0.4%	4.0%	5.0%	3.6%	2.6%
Absent	1.2%	2.0%	1.4%	1.5%	1.8%
Other	0.2%	1.5%	0.3%	0.3%	0.2%
Zero Score	0.0%	0.1%	0.1%	0.0%	0.0%

the exam. We have no way of knowing whether these and similar practices exist or how common they may be. Table 6 also includes the number of otherwise valid records that have a zero score. These records, which vary in number from seven in the 3rd grade test to 161 in the 4th grade, comprise less than one-tenth of one percent of all test booklets in all but two years. As we discuss subsequently, we include a “correction” for excused students and those with missing scores in our subsequent analyses of TAAS scores.

Estimating School Quality

Of the three measures of school quality used in this paper, mean unadjusted z scores probably come closest to what the general public relies on in making quantitative assessments of school quality. TEA makes mean campus and district passing and mastery rates for TAAS widely available and metropolitan and local papers routinely publish them as soon as they are released. TEA also provides mean passing rates by ethnic/race and poverty/non-poverty categories for each campus and district, subject to the suppression of cells with small numbers of students. It uses these data in combination with dropout and daily attendance rates to rate individual campuses and districts.

The most obvious objection to using unadjusted mean z scores to measure school quality

As Table 7, which presents the three reading selection equations for all 5th grade students, indicates, all three equations employ the same logit specification, and, with two

Table 7. Selection Equations: Logit Estimates of Probability of Having a Valid Score on the Fifth Grade TAAS Test in Reading

Explanatory Variables	Special Education		Limited English Proficiency		All Other Students	
	Coef.	t	Coef.	t	Coef.	t
sex	-0.08	-3.3	-0.09	-3.2	-0.16	-5.9
NA-High	0.03	0.1	-0.40	-0.5	-0.33	-1.0
NA-Low	-0.33	-0.5			-0.19	-0.2
NA-Very Low	-1.08	-3.5	-0.86	-1.4	-0.29	-0.8
Asian-High	0.05	0.3	-0.77	-3.6	0.25	1.7
Asian-Low	-0.15	-0.3	-1.54	-5.3	0.38	0.8
Asian-Very Low	-0.46	-1.9	-1.37	-6.7	-0.83	-6.0
Black-High	-0.64	-10.2	-0.10	-0.2	-0.21	-2.9
Black-Low	-0.89	-7.6	1.17	1.6	-0.10	-0.7
Black-Very Low	-1.26	-29.9	-0.79	-2.4	-0.58	-12.8
Hispanic-High	-0.18	-3.6	-0.87	-4.5	-0.13	-2.4
Hispanic-Low	-0.31	-3.9	-0.77	-3.9	0.16	1.6
Hispanic-Very Low	-0.69	-17.4	-1.05	-5.6	-0.36	-8.3
Anglo-Low	-0.47	-7.4	0.03	0.1	-0.15	-1.9
Anglo-Very Low	-0.77	-20.4	-0.76	-3.0	-0.31	-6.7
Ever LEP	-0.59	-13.1			-1.07	-23.9
Ever Spec Ed			-1.19	-31.2	-1.87	-61.8
Years Retained	0.05	1.0	-0.06	-1.2	-0.06	-1.1
Ever Dbl Prom	-1.20	-8.5	-0.14	-1.1	-0.37	-2.3
Age	0.00	24.4	0.00	6.8	0.00	9.3
Days Absent	-0.04	-19.6	-0.01	-5.7	-0.07	-43.5
One Year	-0.25	-2.4	-1.19	-12.2	-1.62	-19.6
Two Years	-0.40	-3.0	-1.76	-14.5	-1.59	-18.9
Three Years	-0.22	-2.8	-2.36	-33.0	-1.61	-33.0
Four Years	-0.16	-2.7	-1.66	-31.4	-0.78	-13.4
Five Years	0.01	0.2	-0.74	-15.6	-0.53	-10.2
Six Years	0.00	-0.1	-0.24	-5.7	-0.28	-6.7
Campus Percent LEP	-0.95	-9.7	-0.88	-13.7	-0.25	-2.4
Campus Percent Spec Ed	-2.84	-11.9	1.21	3.8	-1.09	-3.7
Constant	-10.94	-21.9	-1.83	-3.3	-0.33	-0.6
N		33,477		27,454		210,399
chi2(28)		4,403		3,835		8,186
Prob>chi2		0		0		0
PseudoR2		0.10		0.10		0.14

exceptions, include the same explanatory variables. The dummy variable everspec (ever

[7] See Hanushek (1979) for a discussion of the value added model.

special education) is left out of the special education selection equation because all of the students in this sub-sample are enrolled in special education, and similarly the dummy variable everLEP is left out of the LEP selection equation because all of the students are LEP. Both variables are included in the selection equation for the remaining students, those that are neither LEP nor enrolled in special education.

In addition to everspec and everLEP, the three selection equations include 24 other independent variables that describe individual students and two campus level variables. The individual variables, in the order shown in Table 7, are a male-female dummy, 13 dummies that are race/ethnicity, family income interactions, dummies for ever retained in grade and ever double promoted, age, average days absent and six dummy variables for the number of years in the sample. The two campus variables are the fractions of students in the particular grades that were enrolled in special education classes and the proportion that are LEP. Inclusion of the campus percentage special education is meant to identify campuses with special education classrooms for children with more severe disabilities. Campuses with these functions would be expected to have higher proportions of exempt students. In the case of LEP, campuses with higher fractions of LEP children are more likely to offer bilingual education classes and give the Spanish language version of TAAS.

The Level Equations

Both the level and value added equations are estimated with campus fixed effects. Use of campus fixed effects, which is equivalent to including a dummy variable for each campus, eliminates all campus level influences from the parameter estimates, with the result that the individual parameter estimates represent only individual student influences. In addition to the three selection variables, the campus fixed effects level regressions include 28 other explanatory variables.

Table 8 presents estimates of selected coefficients from the five English language reading regressions plus the coefficient of determination (R^2) for each equation. Because of the large sample sizes, nearly all of the coefficients shown in both tables 8 and 9 are highly significant statistically. The complete fixed effects level regressions, including t statistics and other statistics, for both the reading and math are reported in Appendix Tables A-2 and A-3. The overall explanatory power of the five English language equations vary from a low of 27 percent for the 3rd grade math test to a high of 37 percent for the 7th grade math and reading tests. There is some tendency for the explanatory power of the

Table 8. Selected Coefficients from the Level Fixed Effects Reading Regressions by Grade

Variable	Third	Fourth	Fifth	Sixth	Seventh
Race/Ethnicity and Family Income					
Asian- High	0.00	-0.01	0.01	0.00	-0.02
Asian- Low	-0.14	-0.23	-0.21	-0.28	-0.19
Asian-Very Low	-0.18	-0.26	-0.20	-0.28	-0.24
Black-High	-0.36	-0.56	-0.53	-0.57	-0.46
Black-Low	-0.40	-0.68	-0.64	-0.70	-0.59
Black-Very Low	-0.62	-0.84	-0.83	-0.85	-0.71
Hisp-High	-0.21	-0.31	-0.28	-0.35	-0.29
Hisp-Low	-0.30	-0.44	-0.42	-0.46	-0.38
Hisp-Very Low	-0.44	-0.56	-0.54	-0.59	-0.49
Anglo-Low	-0.15	-0.19	-0.19	-0.23	-0.19
Anglo-Very Low	-0.26	-0.32	-0.30	-0.32	-0.26
Other Individual Variables					
Sex	-0.11	-0.08	-0.07	-0.02	-0.20
Both Special Education	-0.86	-0.36	-0.44	-0.41	-0.64
Ever LEP	-0.08	-0.05	-0.01	-0.02	-0.07
Years Retained	-0.39	-0.42	-0.34	-0.25	-0.23
Ever Dbl Promoted	0.09	0.20	0.15	0.03	-0.01
Selection Variables					
Special Education	0.94	0.17	0.33	0.06	0.39
LEP	-0.42	-0.37	-0.27	-0.23	-0.18
Other	0.28	0.36	0.51	0.52	0.70
R^2	0.30	0.32	0.29	0.31	0.33
Observations	223,245	227,486	229,025	236,471	239,734

equations to increase with grade. A number (approximately 12,400) of LEP children also took a Spanish test in the 3rd grade. The R^2s for the Spanish language tests were 0.33 for math and 0.37 for reading.

The level equations offer few surprises. The sex dummies, for example, yield the expected result that, holding everything else constant, girls do slightly better in reading and boys do slightly better in math. In addition, the signs and magnitudes of the coefficients of the 11 race/ethnicity, family income dummy variables included in Table 8 are remarkably consistent with a priori expectations and across equations. The coefficients of the Native American family income interaction variables are not included in the table because of their small numbers; they are included in the appendix tables. The family income variables are based on data from the school lunch program. Eligibility for free and reduced price lunches is based on the federal poverty level, considers both family income and size and is uniform across districts. The coefficients of the race/ethnicity, family income variables should be interpreted relative to high-income Anglos, which is the omitted category. All of the coefficients are negative except one, children from Asian high income families, and this coefficient is very small. Holding income constant, Anglos and Asians have higher scores than blacks or Hispanics. Of the latter two minority groups, blacks consistently have lower achievement scores holding the remaining variables constant. For the English language reading equations, there is only one inversion in the rankings of the coefficients of the race/ethnicity, income dummies by income; the coefficient for the Asian-Low dummy is slightly larger than for the Asian-Very Low dummy.

The next five coefficients, for both special education (the sum of the ever-special education and special education in the current year coefficients) years retained in grade, the ever double promoted dummy and the ever LEP dummy, all have significant impacts on student achievement. As discussed previously, we have included all special education students that were not exempted from taking TAAS in the analysis. There seems to us to be no right answer to the important question of how to treat special education students in the analysis; the alternative would have been to exclude all special education students. The level equations also include two special education variables, dummies indicating whether the student was in special education in the year the test was given and whether the student was ever classified as special education. The combined impacts of the two special education dummies, represented in Table 8 by “both special education,” are substantial. We combined these coefficients because the two special education variables are highly correlated, particularly in the higher grades. The combined effects of these variables, which vary in the range –0.36 to –0.64 in grades four through seven, are significantly higher, –0.86, in grade three.

The impact of ever LEP on reading performance was, to us, surprisingly small, ranging from –0.013 in the 5th grade to -.081 in the 3rd. Grade retention, by contrast, is strongly related to reading performance; these scores are between .23 and .42 of a standard deviation lower for each year a student is retained in grade. Being double promoted increases test scores, but the effect is much smaller than for grade retention. The effects of both years retained in grade and ever double promoted appear to decay somewhat over time, with their impact being larger in the earlier than the latter grades. In the case of years retained in grade, for example, the reading z scores for 4th grade students are .43 of a standard deviation and those for 7th grade students are .23 of a standard deviation below those who followed the usual grade progression. The effects of being double promoted, which are positive, are much smaller in absolute value and become quite small or zero for 7th grade reading and math.

The signs of the special education selection variable is positive for all grades, while the LEP correction is negative for all grades. The "other" selection coefficient is positive in all but the Spanish language equation.

Value Added Regressions

The specifications and explanatory variables included in the value added equations are identical to those used for the level regressions with two exceptions. The value added regressions also include the previous year's reading or math score and a predicted prior year reading or math score for students who were not in the sample in the previous year. Since some 3rd grade students took a Spanish language exam, the 3rd grade equations also include actual and predicted reading or math scores on these tests. As with the level regressions, the full set of reading and math equations, including t statistics, are presented in Appendix Tables A-4 and A-5 while coefficient estimates for a subset of variables are shown in Table 9 along with the equation R^2s and the number of observations.

The first thing that should be noted about the value added equations is that their explanatory powers are much greater than for the level equations for the same grades. The fraction of explained variance for all four value added equations is greater than 50 percent and the highest R^2 is 0.59 for the 7th grade equation.

The much higher R^2s for the value added equations, of course, are attributable to the inclusion of actual or predicted prior year test scores and, in the case of some Hispanic LEP students actual and predicted scores on the Spanish language test given in the 3rd grade. While they are not shown in Table 9 (see Appendix tables A-5 and A-6), the t statistics for these prior test scores are huge. The t statistic for the actual grade six reading score in the 7th grade value added regression, for example, is 379 and the t statistic for the predicted grade six reading score in the same regression is an impressive 135. Even the actual and predicted 3rd grade Spanish language scores in the 4th grade reading equations have healthy t statistics, t=34 for the actual score and t=5 for the predicted one.

Further inspection of Table 9 reveals that the coefficients of the actual and predicted 3rd grade reading scores in the 4th grade equation are nearly identical and close to 0.6. The coefficients of the actual and predicted 3rd grade Spanish language scores are smaller, 0.39 and 0.26, but are still substantial, and, as noted above, are highly significant statistically. The coefficients of the predicted score in the remaining three value added equations are very similar, 0.64 to 0.68. The coefficients of the predicted reading scores for grades five through seven are also very close to each other, 0.90 to 0.99, but they are very different from the value of the same coefficient in the grade 4 equation, which was 0.58.

As was true of the race/ethnicity, income dummies in the level equations, the coefficients of these variables in the value added equations are also highly regular. All but two of the 44 race/ethnicity, income coefficients are negative. The positive sign for the 7th grade only appears in the 3rd decimal place and its t statistic is only t = 0.3. The positive coefficients in the 4th and 5th grade equation are statistically significant, but their values are small. There was only one income inversion, the Asian Low and Asian Very Low coefficients and neither of these coefficients were statistically different from zero (t = -0.5 and = -0.25).

The sex coefficient was negative in all but the 6th grade reading equation, indicating that boys had smaller reading gains in three of the four years. The results for the sex variable

Table 9. Selected Cofficients for the Value Added Fixed Effects

Variables	Grade4	Grade5	Grade6	Grade7
Prior Scores				
Actual Reading	0.60	0.68	0.64	0.64
Predicted Reading	0.58	0.91	0.90	0.99
Actual Spanish	0.39	NI	NI	NI
Predicted Spanish	0.26	NI	NI	NI
Race/Ethnicity and Family Income				
Asian- High	0.03	0.03	-0.03	0.00
Asian- Low	-0.10	-0.01	-0.12	-0.01
Asian-Very Low	-0.09	-0.01	-0.15	-0.05
Black-High	-0.34	-0.13	-0.21	-0.08
Black-Low	-0.41	-0.15	-0.25	-0.13
Black-Very Low	-0.48	-0.23	-0.29	-0.16
Hisp-High	-0.19	-0.06	-0.14	-0.05
Hisp-Low	-0.27	-0.11	-0.17	-0.07
Hisp-Very Low	-0.33	-0.13	-0.23	-0.11
Anglo-Low	-0.11	-0.05	-0.08	-0.05
Anglo-Very Low	-0.18	-0.08	-0.13	-0.06
Other Individual Variables				
Sex	-0.01	-0.01	0.02	-0.19
Both Special Education	0.34	-0.12	-0.03	-0.16
Ever LEP	-0.01	0.02	0.02	-0.02
Years Retained	-0.26	-0.08	-0.06	-0.05
Ever Dbl Promoted	0.16	0.04	0.00	-0.03
Selection Variables				
Special Education	0.17	0.25	-0.14	0.13
LEP	0.42	0.18	0.04	0.07
Other	0.64	0.32	0.22	0.34
R-squared	0.51	0.56	0.56	0.59
Observations	222,537	229,025	236,471	239,734

in the value added math equations were less regular than for the level ones. The coefficient was small in absolute value in all four years, but was negative (boys did less well) in the 4th and 7th grade and positive in the 5th and 6th. The coefficient of the combined special education coefficients was positive in the 4th grade equation, but was negative in the equations for grades five through seven. The coefficients for the ever LEP dummy were negative for grades four and seven and positive in grades five and six; they were, moreover, small in absolute value in all four years. The effects of years retained were negative and large in the first year (grade four), but were significantly smaller in absolute value in the remaining three years and, as in the level equations, there was a persistent decrease in their magnitudes over time. The coefficient of the ever double promoted variable was positive and fairly large in grade four, 0.16, but also declined in magnitude and is actually negative by the 7th grade.

Suburban-Central City Differences in School Quality for Large Metropolitan Areas

The principal reason for estimating the level and value added regressions was to use them in calculating our second and third school quality measures. These measures are simply mean residuals for each campus, district or other geographic area obtained by subtracting the predicted value from either the level or value added equations from the actual value. This residual calculation differs from the more usual approach of subtracting actual values from predicted values because we plan to use the means as measures of school quality. By subtracting predicted values from actual values we obtain the result that campuses or districts that have higher actual scores than predicted scores will have a positive value for the resulting school quality measure. On average the students at campuses with positive school quality measures had higher scores than would have been expected given their characteristics.

The approach we employ in using adjusted standardized test scores to compute measures of school quality is similar to the one used by TEA in its Accountability Rating System for Texas Public Schools (TEA, 1994). Using TAAS passing rates for reading, writing and mathematics for non-special education students as well as the previous years dropout and attendance rates, TEA designates individual campuses as Exemplary, Recognized, Acceptable or Low Performing. To obtain one of the top two ratings, both all students and each of the student groups African American, Hispanic, White and Economically

Disadvantaged must meet each standard. Dallas ISD, South Carolina and a number of other districts and states have similarly used standardized tests to assess the performance of individual campuses and districts (Clotfelter and Ladd, 1996). It is also similar to the approach used by Hanushek (1971 and 1972), Murnane (1975) and others to assess the performance of individual classroom teachers and to quantify teacher quality. The principal difference between our approach and TEA's is that we use different methods and a somewhat larger number of student/family background controls and rely entirely on test scores while TEA also includes dropout rates and retention rates in its analysis.

While the school quality measures obtained from the level and value added regressions are arguably an improvement over unadjusted mean z scores, there remain problems. The most serious of these is limited family background data. The use of the previous year's reading/math score in the value added equations significantly reduces the severity of these omissions, but does not entirely eliminate them. In addition, there are selection issues, although their exact relationship to the missing family background variables is far from obvious. If we were forced to guess, we would propose that campuses and districts with higher mean test scores have more children with unobserved characteristics that are associated with higher test scores.

In the analyses that follow we present summaries of our level and value added adjusted, school quality measures for all students and for African Americans. The estimates for all students are obtained using the pooled equations presented in the appendix, while the estimates for African Americans are obtained using race/ethnic specific equations. The race specific equations employ the same explanatory variables as the pooled (all race/ethnic group) equations, except that by stratifying the equations, we provide full interactions between race/ethnicity and all other explanatory variables.

Before we present summary statistics describing the suburban inner city differences in the three school quality measures for both reading and math by race, grade and PMSA, we first illustrate their computation using data for the Dallas PMSA. The first two rows in Table 10 are actual unadjusted z scores by grade for Dallas' suburbs and for DISD. The third row is simply the difference (suburb minus inner city) in the mean unadjusted z scores for these two areas. These and all of the remaining values in this table are for all students.

Table 10. Alternative Measures of School Quality (Reading) for DISD and Dallas Suburbs Calculated from the Pooled Regressions

Quality Measure and Area	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
Actual Z Scores					
Suburban	0.23	0.28	0.22	0.24	0.24
DISD	-0.38	-0.44	-0.46	-0.30	-0.26
Suburb minus DISD	0.61	0.72	0.68	0.54	0.50
School Quality from Level Equations					
Predicted					
Suburban	0.15	0.19	0.16	0.19	0.18
DISD	-0.25	-0.32	-0.26	-0.25	-0.18
Suburb minus DISD	0.40	0.50	0.43	0.44	0.36
Actual minus Predicted					
Suburban	0.08	0.09	0.06	0.06	0.06
DISD	-0.13	-0.12	-0.20	-0.05	-0.08
Suburb minus DISD	0.22	0.21	0.25	0.10	0.14
School Quality from Value-Added Equations					
Predicted					
Suburban		0.23	0.22	0.21	0.25
DISD		-0.28	-0.29	-0.32	-0.22
Suburb minus DISD		0.51	0.51	0.53	0.47
Actual minus Predicted					
Suburban		0.05	0.00	0.04	-0.01
DISD		-0.16	-0.17	0.02	-0.04
Suburb minus DISD		0.21	0.17	0.02	0.03

The second panel (labeled School Quality from Level Equations) demonstrates how the second school quality measure is calculated. We begin by calculating the means of predicted reading scores obtained from the pooled (all students) level fixed effects regressions for all students attending suburban and inner city schools. The level adjusted quality measure for the Dallas suburban districts and DISD is then simply the difference between mean actual reading scores (lines one and two) and the predicted mean reading scores (lines three and four). As noted previously, this procedure insures that campuses with higher actual than predicted scores will have positive values for the resulting school quality measure.

The final panel presents the same calculations for the third school quality measure. The procedure is identical to that used for the level adjusted quality measure, except that predicted values from the value added reading regressions are used. The mean suburban, inner city difference declines from the 3rd to the 7th grade, from .21 for the 3rd grade to 0.03 for the 7th. A similar result occurs for the level equations: the suburban, inner city difference first increases by a small amount from .22 in the 3rd grade to a high of .25 in the 5th grade and then declines sharply to .10 in the 6th and finally to .14 in the 7th grade.

Following the procedures outlined above for all Dallas students, Table 11 provides estimates of suburban-inner city differences in the three school quality measures for both reading and math for all students and for black students attending public schools in each of the state's five largest metropolitan areas by year. The adjusted black scores are obtained from separate black equations, which include only blacks. The z scores for black students used in these regressions are calculated using the mean reading scores and standard deviations for all students taking the test.

The table includes 100 suburban-inner city differences in mean unadjusted z scores [reading and math times two race/ethnicity categories (all students and African Americans) times five grades]. In only one instance, math scores for black students in grade 5, is the mean unadjusted inner city score higher than the mean suburban score. A less obvious result is that with two exceptions the mean suburban-inner city differences for all students are substantially larger than for African Americans. The exceptions are reading scores for black 3rd and 5th grade students in the Austin metropolitan area.

Both the level and value added adjustments significantly reduce the size of the suburban-inner city differential in mean z scores. The result is again not surprising; the purpose of both procedures is to standardize the individual z scores for differences in family background and in a sense to place schools on a more level playing field. The bottom of

Table 11. Suburban Minus Inner City Quality Measures by Test, Type and Year for All Students and African-American Students

Quality Measure	Test	Race	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
Houston							
Unadjusted Mean Z	R	All	0.24	0.34	0.31	0.34	0.35
Unadjusted Mean Z	M	All	0.25	0.37	0.23	0.41	0.42
Unadjusted Mean Z	R	Black	0.05	0.09	0.10	0.05	0.10
Unadjusted Mean Z	M	Black	0.04	0.14	-0.03	0.04	0.09
Level Adjusted	R	All	-0.07	-0.03	-0.03	-0.01	0.01
VA Adjusted	R	All		0.01	-0.01	-0.01	0.03
Level Adjusted	M	All	-0.09	0.01	-0.11	0.05	0.05
VA Adjusted	M	All		0.07	-0.10	0.10	0.02
Level Adjusted	R	Black	-0.05	0.00	0.02	0.00	0.06
VA Adjusted	R	Black		-0.01	0.03	0.00	0.06
Level Adjusted	M	Black	-0.04	0.05	-0.11	-0.01	0.03
VA Adjusted	M	Black		0.13	-0.12	0.04	0.04
Dallas							
Unadjusted Mean Z	R	All	0.61	0.72	0.68	0.54	0.50
Unadjusted Mean Z	M	All	0.55	0.63	0.55	0.47	0.57
Unadjusted Mean Z	R	Black	0.28	0.25	0.31	0.15	0.24
Unadjusted Mean Z	M	Black	0.21	0.19	0.12	0.06	0.17
Level Adjusted	R	All	0.22	0.21	0.25	0.10	0.14
VA Adjusted	R	All		0.13	0.14	-0.03	0.06
Level Adjusted	M	All	0.12	0.15	0.12	0.01	0.14
VA Adjusted	M	All		0.12	0.04	-0.05	0.10
Level Adjusted	R	Black	0.23	0.17	0.25	0.11	0.23
VA Adjusted	R	Black		0.04	0.14	-0.03	0.13
Level Adjusted	M	Black	0.18	0.12	0.08	0.03	0.16
VA Adjusted	M	Black		0.19	0.00	-0.04	0.10
Fort Worth							
Unadjusted Mean Z	R	All	0.49	0.45	0.33	0.46	0.44
Unadjusted Mean Z	M	All	0.45	0.45	0.34	0.53	0.49
Unadjusted Mean Z	R	Black	0.32	0.25	0.16	0.28	0.27
Unadjusted Mean Z	M	Black	0.17	0.19	0.11	0.33	0.27
Level Adjusted	R	All	0.20	0.07	-0.02	0.04	0.09
VA Adjusted	R	All		-0.02	-0.05	0.04	0.08
Level Adjusted	M	All	0.14	0.09	-0.01	0.09	0.09
VA Adjusted	M	All		0.06	-0.06	0.10	0.04
Level Adjusted	R	Black	0.27	0.15	0.08	0.20	0.24
VA Adjusted	R	Black		0.01	0.00	0.12	0.13
Level Adjusted	M	Black	0.14	0.11	0.04	0.24	0.23
VA Adjusted	M	Black		0.14	-0.05	0.20	0.06

Table 11 Con't.. Suburban Minus Inner City Quality Measures by Test, Type and Year for All Students and African-American Students

San Antonio							
Unadjusted Mean Z	R	All	0.41	0.58	0.50	0.55	0.50
Unadjusted Mean Z	M	All	0.36	0.62	0.45	0.65	0.57
Unadjusted Mean Z	R	Black	0.32	0.52	0.42	0.49	0.45
Unadjusted Mean Z	M	Black	0.21	0.49	0.31	0.50	0.50
Level Adjusted	R	All	0.17	0.32	0.23	0.27	0.27
VA Adjusted	R	All		0.23	0.05	0.14	0.11
Level Adjusted	M	All	0.11	0.38	0.19	0.38	0.32
VA Adjusted	M	All		0.31	-0.03	0.25	0.05
Level Adjusted	R	Black	0.23	0.41	0.30	0.38	0.36
VA Adjusted	R	Black		0.25	0.08	0.22	0.11
Level Adjusted	M	Black	0.14	0.39	0.21	0.39	0.40
VA Adjusted	M	Black		0.38	-0.04	0.26	0.10
Austin							
Unadjusted Mean Z	R	All	0.17	0.33	0.34	0.37	0.44
Unadjusted Mean Z	M	All	0.08	0.30	0.36	0.53	0.58
Unadjusted Mean Z	R	Black	0.17	0.36	0.41	0.31	0.43
Unadjusted Mean Z	M	Black	0.07	0.28	0.33	0.45	0.47
Level Adjusted	R	All	0.08	0.16	0.17	0.17	0.25
VA Adjusted	R	All		0.15	0.08	0.07	0.19
Level Adjusted	M	All	-0.04	0.14	0.19	0.31	0.37
VA Adjusted	M	All		0.19	0.10	0.19	0.20
Level Adjusted	R	Black	0.22	0.31	0.37	0.29	0.42
VA Adjusted	R	Black		0.18	0.19	0.11	0.28
Level Adjusted	M	Black	0.09	0.24	0.29	0.42	0.45
VA Adjusted	M	Black		0.22	0.13	0.25	0.23

Higher than Suburbs by Grade	Total	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
Houston	17	4	1	7	5	0
Dallas	5	0	0	1	4	0
Fort Worth	7	0	1	6	0	0
San Antonio	2	0	0	2	0	0
Austin	1	1	0	0	0	0
Total	32	5	2	16	9	0

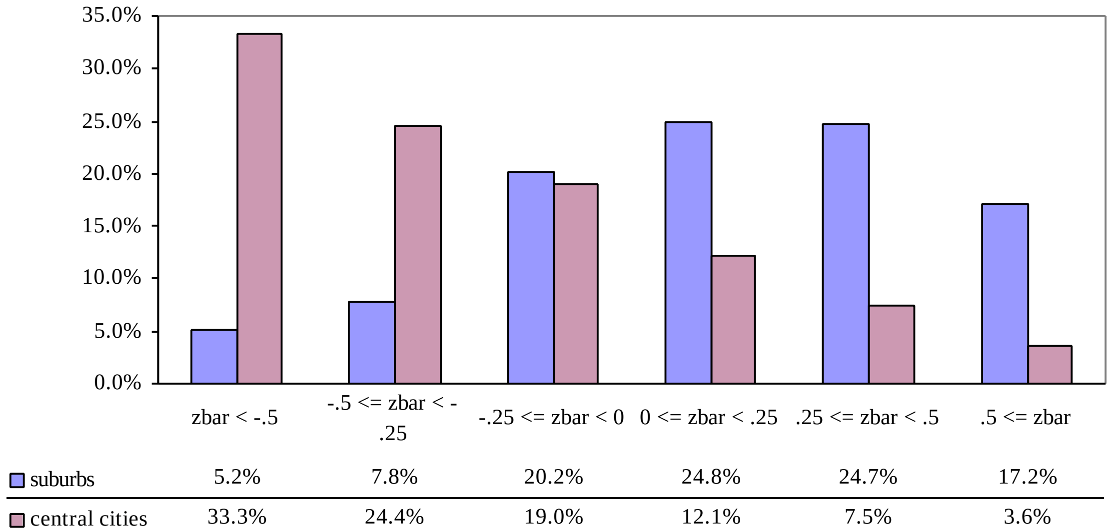
this two-page table indicates the number of times in which particular inner city districts have higher adjusted scores than the average of their surrounding suburbs by grade. There are 36 adjusted scores for each metropolitan area. As these data indicate, using these adjusted school quality measures, Houston ISD does better than its suburban counterparts in 17 cases. The number of times the remaining inner city districts did better than the average of their suburban counterparts are Fort Worth ISD seven, Dallas ISD five, San Antonio ISD two and Austin ISD one. There are also differences by grade: inner city adjusted scores exceed suburban ones 16 times for 5th graders, nine times for 6th graders, five times for 3rd graders, twice for 4th graders and never for 7th graders. In all, inner city districts do better than the average of their suburban districts in 32 of 180 instances or 21 percent of the time.

Variations in Campus School Quality With Central Cities and Suburbs of Large Metropolitan Areas

There is considerable variability in the school quality in both the suburbs and central cities. This conclusion holds in general and for the schools attended by African American students. One indication of this variability is demonstrated by Figure 1, which shows the percentages of inner city and suburban campuses for each of six mean unadjusted z score categories for the five largest metropolitan areas. As these data reveal, only 5.2 percent of suburban campuses have mean z scores below –0.5, while 33.3 percent of inner city campuses fall below this level. At the opposite extreme, 17.2 percent of suburban campuses, as contrasted to 3.6 percent of inner city campuses, have mean unadjusted scores that exceed .5.

More extensive information on the extent of inner city and suburban variation in the three school quality measures is provided in Table 12, which gives the distributions of the campus unadjusted, level adjusted and value added adjusted school quality for each of the five largest and all five PMSAs combined. The categories in Table 12 refer to the campus level of each of the three school quality measures, which are obtained from the pooled equations for all students. Except for the last column, the frequencies are the number of black students attending each type of campus. The last column, which is the

Figure 1. Number of Campuses by 1994 Campus Average Z-score



same distribution for all students in the five largest PMSAs combined, provides something of a benchmark for comparing the differences in the black distributions between the inner city and suburbs and among the five metropolitan areas.

The differences between central cities and suburbs and among the five metropolitan areas are striking. Starting with the unadjusted campus means for Houston, more than twice (55 percent) as many black 7th graders in HISD schools attend schools with campus unadjusted quality below .25 than the number (23 percent) for Houston's suburbs. The last column indicates that the proportion of all students attending schools in this unadjusted school quality category is 13 percent and the next to last column reveals that the fraction of all black attending schools in this school quality category is 35 percent. The shares for Dallas' inner city (70 percent) and suburban schools (five percent) are even more extreme. In the case of Dallas, three percent of DISD black 7th graders attended schools in the highest unadjusted quality category. The proportion of all students attending schools of this quality is 22 percent and the percentage of black residents of large metropolitan areas is 16 percent.

Table 12. Percent Distribution of Seventh Grade Suburban and Inner City Black Students And All Students by Unadjusted and Adjusted School Quality Measures by PMSA in 1996

	Houston		Dallas		Fort Worth		San Antonio		Austin		All PMSAs	
School Quality	Suburbs	IC	Suburbs	IC	Suburbs	IC	Suburbs	IC	Suburbs	IC	Black	All
Unadjusted												
Less than -.25	23	55	5	70	6	41	9	59	1	59	35	13
-.25 - 0	18	21	19	8	27	45	37	41	40	15	21	20
0 - .25	44	9	45	19	40	0	40	0	20	26	29	45
Greater than .25	15	15	31	3	27	14	14	0	40	0	16	22
Total	100	100	100	100	100	100	100	100	100	100	100	100
Level Adjusted												
Less than -.25	8	70	0	58	0	25	4	50	0	47	28	13
-.25 - 0	45	16	14	29	18	54	53	50	27	27	31	20
0 - .25	39	13	74	13	65	21	43	0	63	24	35	45
Greater than .25	8	1	12	0	17	0	0	0	10	2	5	22
Total	100	100	100	100	100	100	100	100	100	100	100	100
Value-Added Adjusted												
Less than -.25	19	55	5	68	0	39	12	55	1	51	33	16
-.25 - 0	28	26	19	12	33	47	43	45	43	23	26	20
0 - .25	38	15	57	16	34	7	36	0	17	9	29	35
Greater than .25	16	4	20	3	34	7	9	0	39	17	13	29
Total	100	100	100	100	100	100	100	100	100	100	100	100
Total Students	5,644	3,511	3,255	3,632	1,006	1,332	922	413	466	762	20,943	126,772

School Quality and Black Achievement

Preceding analyses have demonstrated that in 1996 there were more African Americans enrolled in the suburban school districts of the five largest Texas metropolitan areas than in their inner city districts and that the suburban share grew rapidly during 1990-1996. Second, the analyses confirmed the widely held impression that suburban schools are "better" than inner city schools, although their superiority is much less when measured by either level or value added adjusted quality measures, which consider the characteristics of their individual students. It is now time to consider whether blacks attending suburban schools do better than otherwise identical blacks enrolled in inner city schools. In making these assessments, we recognize that the measures of family background used in the level and value added regressions leave something to be desired and that blacks attending suburban schools may differ from blacks attending inner city schools in unmeasured respects that affect their performance on standardized tests.[8] These concerns

[8] There are large differences in the characteristics of black fourth graders enrolled in central city and suburban districts in 1994. Forty-eight percent of black suburban students are from high-income (no free or

are somewhat less when prior test scores are used, but they do not disappear entirely.

To assess whether blacks benefit from attending higher quality suburban schools, we include each of the three school quality measures in level and value added regressions that are similar to those we used to estimate campus quality. In calculating the school quality measures used in the black school quality regressions, we remove the effect of each individual's score on each of the three measures before including them in the regressions. Because the school quality measures are campus level variables, it is not possible or appropriate to include campus fixed effects. As a result, those equations are estimated by ordinary least squares (OLS). In addition, since the selection variables were included in the equations used to estimate predicted scores, we do not include them in these equations. Finally, because our three quality variables are highly correlated, we estimate three alternative specifications for both the level and value added equations.

Table 13 contains coefficient estimates and t statistics for the school quality measures used in the black school quality regressions as well as the coefficient of determination (R^2) for each equation. The complete equations are presented in Appendix Tables A-6 through A-9. There are four equations for both the level and value added equations for each test and grade. The first is a base case and no coefficients are shown, as it includes no school quality measures. Our purpose in estimating the base case equations is to determine how much the addition of the campus level school quality increases the explained variance of the individual black equations. These school quality measures, of course, include the effects of all variables that have a systematic effect on the achievement of all students enrolled in a particular grade at a particular campus in a given year. At minimum, these variables include teacher quality, curriculum differences, community characteristics, and peer effects. In the case of the 1992 level equations, for example, the R^2 for the base case equation with no school quality variable is 0.17. When the unadjusted school quality measure is included in the equation, the R^2 increases to .22 and when the adjusted measure is used instead, the R^2 increases to 0.23. Including both

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reduced lunch) households as contrasted with only 22 percent of central city students. Similarly 71 percent of central city students were from very low-income (received free lunches) families as contrasted with only 42 percent of suburban families. Black students attending suburban schools were also more likely to be in special education classes (eight percent versus four percent), were somewhat less likely to be retained in

Table 13. Selected Coefficients from Black School Quality Equations

Specification and Year	Level Equations					Value Added Equations				
	Unadjusted		Adjusted			Unadjusted		Adjusted		
	coef.	t	coef.	t	R2	coef.	t	coef.	t	R2
Grade 3										
Base					0.17	No Third Grade Value Added Equations				
Alt 1	0.61	36.3			0.22					
Alt 2			0.90	41.9	0.23					
Alt 3	-0.01	-0.2	0.91	20.3	0.23					
Grade 4										
Base					0.12					0.36
Alt 1	0.58	39.2			0.18	0.38	30.2			0.38
Alt 2			0.92	46.1	0.20			0.75	37.2	0.40
Alt 3	0.10	4.0	0.81	23.7	0.20	0.10	5.8	0.63	22.0	0.40
Grade 5										
Base					0.13					0.45
Alt 1	0.54	32.6			0.17	0.29	21.7			0.46
Alt 2			0.90	38.2	0.18			0.70	29.3	0.47
Alt 3	0.10	3.8	0.78	19.8	0.18	0.06	3.6	0.63	19.9	0.47
Grade 6										
Base					0.13					0.45
Alt 1	0.53	32.5			0.17	0.33	24.9			0.46
Alt 2			0.93	37.2	0.18			0.81	35.3	0.48
Alt 3	0.13	4.8	0.76	18.3	0.18	0.05	2.9	0.76	24.8	0.48
Grade 7										
Base					0.17					0.51
Alt 1	0.57	30.8			0.21	0.26	18.0			0.52
Alt 2			0.99	32.9	0.21			0.64	20.7	0.52
Alt 3	0.19	5.4	0.73	12.7	0.21	0.10	5.4	0.49	11.5	0.52

the unadjusted and adjusted variables produces no additional increase in the overall explanatory power of the equation. This pattern occurs for all years and for both the level and value added equations.

The relative magnitudes of the school quality coefficients for the three alternative

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grade, and were absent fewer days.

specifications are also remarkably consistent across years in both the level and value added equations. In all of the level and value added equations the size and statistical significance of the adjusted school quality measure is larger than those for the unadjusted one. As we show in the next section, these consistent size differences are due in large part to the magnitudes of the two variables. When both variables are included

(Alternative 3) the statistical significance of both variables declines, an indication that the school quality measures are highly correlated. As is common in such situations, the size of both coefficients is reduced somewhat. The decreases in the coefficient of the unadjusted school quality variable are particularly large. In the 1992 Alternative 3 equation, the t statistic of the unadjusted school quality variable is only –0.2 and the coefficient is -0.01.

While there are numerous issues that might be raised about these equations, they provide a strong prima facie case that the individual achievement of black children is strongly affected by differences in school quality. This result holds whether unadjusted or adjusted z scores are used and whether the adjusted z scores are obtained using level or value added equations. One caveat is order. We refer to the unadjusted and adjusted measures we include in these black regressions as measures of school quality. They might more precisely be described as measures of school/grade quality. As a closely related paper by Rivkin, Hanushek and Kain (1997), that also employs data from TSDB, indicates, there appear to be large differences in achievement gains within schools. Regardless of whether these are differences in school quality or more precisely differences in school/grade quality, they appear to have a large effect on the achievement of individual black students. We now turn to the question of how large an impact the previously discussed suburban–inner city differences have on black student achievement.

Estimated Impacts of Moving to the Suburbs on Black Achievement

The black school quality equations discussed in the preceding section provide what we described as a strong prima facie case that differences in school quality have a substantial effect on black student achievement. We now consider whether greater access by African American children to suburban quality schools would increase their achievement. To be more precise, we ask by how much and in what direction the reading scores of a representative black student would change if he/she was able to attend a school whose quality was equal to the suburban average instead of one that was equal to the inner city average. This suburban quality school could, in principle, be located in the inner city, but as Table 12 indicates there are few inner city schools of this quality. In addition, if there were no constraints on black residential choice, we would expect most African American parents with an interest in obtaining better schooling for their children to move to the suburbs before their children enter school, just as most Anglo parents do. In this regard its worth noting that less than 20 percent of the 4,026 black cohort three children enrolled in Dallas suburban schools in 1996 attended DISD schools in 1990 and that more than half attended Dallas suburban schools in both 1990 and 1996 and 20 percent were not in the sample in 1990. The latter presumably lived in other states in 1990 or were enrolled in private schools.

As the estimates in Table 14 indicate, for all grades and metropolitan areas, larger predicted increases in reading performance are obtained from using the unadjusted school quality measure. The largest gains are obtained using the unadjusted school quality measure in the level equations. Taking this exercise at face value, it suggests that .42 of a standard deviation increase in reading would accrue to black 4th graders moving from the average DISD school to the average Dallas suburban school.   The smallest increase using unadjusted z scores, which is .09 of a standard deviation, is obtained for a hypothetical move from the average Houston ISD school to the average Houston suburban school. These modest gains are obtained for both the 5th and 7th grades using the value added equation.

Reflecting the previous result that Houston ISD frequently had higher adjusted z scores than the suburban average, six of the nine equations using the adjusted school quality measure predicted a decline in individual black achievement from a move from the average HISD school to the average school in Houston's suburbs. This same result was obtained in three of nine cases for Fort Worth. Overall only 10 of the 81 estimates are negative and each is small, ranging from –0.004 to 0.06. These results thus suggest that African Americans have generally benefited from access to better suburban schools in Texas' large metropolitan areas.

Table 14. Predicted Changes in Individual Reading Scores for Black Children Moving from a School of Average Inner City Quality to One of Average Suburban Qualtiy by School Quality Measure and PMSA

Specification and Year	Using Level Equations			Using Value Added Equations		
	Houston	Dallas	Ft. Worth	Houston	Dallas	Ft. Worth
Grade 3						
Unadjusted	0.15	0.38	0.30	No Third Grade Value Added Equations		
Adjusted	-0.06	0.20	0.18			
Both	-0.06	0.19	0.18			
Grade 4						
Unadjusted	0.20	0.42	0.26	0.13	0.28	0.17
Adjusted	-0.03	0.20	0.06	0.01	0.10	-0.01
Both	0.01	0.24	0.10	0.04	0.15	0.04
Grade 5						
Unadjusted	0.17	0.37	0.18	0.09	0.20	0.09
Adjusted	-0.03	0.23	-0.02	0.00	0.10	-0.04
Both	0.01	0.27	0.02	0.02	0.13	-0.01
Grade 6						
Unadjusted	0.18	0.29	0.25	0.11	0.18	0.15
Adjusted	-0.01	0.10	0.04	-0.01	-0.02	0.03
Both	0.04	0.15	0.09	0.01	0.01	0.05
Grade 7						
Unadjusted	0.20	0.28	0.25	0.09	0.13	0.11
Adjusted	0.01	0.14	0.09	0.02	0.04	0.05
Both	0.07	0.20	0.15	0.05	0.08	0.08

Conclusions

In sharp contrast to most northern metropolitan areas where very few black students attend public schools outside of central cities, substantial numbers of black children living in the five largest Texas metropolitan areas (Houston, Dallas, Fort Worth, San Antonio and Austin) attend suburban schools. Indeed in 1996 more than half of the black children enrolled in the 7th grade in these metropolitan areas attended suburban schools. This black suburban majority resulted from high 1990 levels, rapid growth in the number of blacks attending suburban schools, and a substantial decline in the numbers attending inner city schools. Between 1990 and 1996 suburban black enrollment in this cohort increased by 27 percent and inner city enrollment declined by 12 percent.

Using standardized test data for a single cohort of students attending Texas public schools between 1990 and 1996, the paper obtains three separate school quality measures. These are mean unadjusted reading and math scores, adjusted scores based on level campus fixed effects regressions, and adjusted scores based on value added campus fixed effects regressions for individual students. All three indices indicate that suburban schools on average are “better” than inner city schools, although there is considerable variation among campus school quality in both the central cities and the suburbs.   The mean suburban-central differences in school quality are smaller for the two adjusted measures, but still substantial.

The concluding section of the paper presents the results of analyses in which the reading and math scores of individual black students attending grades three through seven are regressed on both individual characteristics and each of the three school quality measures. These analyses indicate that school quality (based on standardized test data for all students) has a substantial impact on the reading and math scores of individual black students. Using the results of these equations and the mean differences in school quality for suburban and inner city schools suggests that increased access to “better” suburban schools could have a substantial positive effect on black achievement.

References

Anderson, James D. (1988). *The Education of Blacks in the South, 1860-1935*. Chapel Hill and London: The University of North Carolina Press.

Card, David and Alan B. Krueger. 1992. "School Quality and Black-White Relative Earnings: A Direct Assessment," *The Quarterly Journal of Economics* CVII, 1, (February): 151-200.

Clotfelter, Charles T. and Helen F. Ladd. 1996. "Recognizing and Rewarding Success in Public Schools," in Helen F. Ladd (ed.), *Holding Schools Accountable*. Washington, D.C.: The Brooking Institution.

Coleman, James S. et al. 1966. *Equality of Educational Opportunity*. Washington, DC: U.S. Government Printing Office: 3-34.

Cziko, Gary. 1992. "The Evaluation of Bilingual Education." *Educational Researcher* 21: 10-15.

Farkas, George. 1996. *Human Capital or Cultural Capital? Ethnicity and Poverty Groups in an Urban School District*. New York: Aldine de Gruyter.

Farkas, George. 1996. "Ten Propositions About Schooling, The Inheritance of Poverty, and Interventions to Reduce this Inheritance," in *Research in Social Problems and Public Policy*, Volume 6: 125-169.

Farley, Reynolds and William H. Frey. 1993. "Changes in the Segregation of Whites from Blacks during the 1980s: Small Steps toward a More Integrated Society," Population Studies Center, University of Michigan, Research Report No. 93-285, August.

Hanushek, Eric A. 1971. "Teacher Characteristics and Gains in Student Achievement: Estimation Using Micro-Data," *The American Economic Review*, vol. 61: 280-88.

Hanushek, Eric A. 1971. *Education and Race: An Analysis of the Educational Production Process*. Cambridge, MA: Heath-Lexington.

Hanushek, Eric A. 1979. "Conceptual and Empirical Issues in the Estimation of Educational Production Functions," Journal of Human Resources 14, no. 3 (Fall): 351-88.

Hanushek, Eric A. and John F. Kain. 1971. "On the Value of Equality of Educational Opportunity as a Guide to Public Policy," in *On Equality of Educational Opportunity*. Edited by Frederick Mosteller and Daniel P. Moynihan. New York: Random House, Inc..

Kain, John F. 1992. "The Cumulative Impacts of Slavery: Jim Crow, and Housing Market Discrimination on Black Welfare," HEIR Discussion Paper Number 1608, October.

Kain, John F. and Joseph J. Persky. 1969. "Alternatives to the Gilded Ghetto," *The Public Interest* (Winter).

Kain, John F. and Kraig Singleton. 1996. "Equality of Educational Opportunity Revisited." *New England Economic Review*. (May/June).

Margo, Robert. 1990. *Race and Schooling in the South, 1880-1950: An Economic History*. Chicago: University of Chicago Press.

Massey, Douglas S. and Nancy A. Denton. 1993. *American Apartheid: Segregation and the Making of the Underclass*. Cambridge: Harvard University Press.

Murnane, Richard. J. 1975. *The Impact of School Resources on the Learning of Inner City Children.* Cambridge, MA: Ballinger.

Murnane, R. J. and B. Phillips, 1981. "What Do Effective Teachers of Inner-City Children Have in Common?" *Social Science Research*, 10(1), 83-100.

Rossell, Christine and Keith Baker. 1996. "The Educational Effectiveness of Bilingual Education," *Research in the Teaching of English* 30 (no. 1): 7-74.

TEA (Texas Education Agency). 1994. *Accountability Manual: The 1994-95 Accountability Rating System for Texas Public Schools and School Districts*, Office of Policy Planning and Evaluation (April).

Table A-1. Number of Years in Sample by Race/Ethnicity

Years in Sample	Native American	Asian	Black	Hisp	Anglo	All
1	24.7%	19.1%	16.3%	15.1%	13.1%	14.4%
2	13.6%	11.1%	7.2%	6.9%	7.6%	7.4%
3	7.4%	9.4%	5.1%	4.9%	5.9%	5.5%
4	7.2%	9.5%	4.6%	5.2%	5.8%	5.5%
5	6.9%	7.2%	5.4%	5.6%	6.2%	5.9%
6	8.6%	7.5%	8.8%	8.4%	8.4%	8.4%
7	31.6%	36.4%	52.6%	53.8%	53.0%	52.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Number	1,091	9,389	55,277	134,529	186,950	387,236
Ethnic Percent	0.3%	2.4%	14.3%	34.7%	48.3%	100.0%

Table A-2. Pooled Level Reading Fixed Effects Regressions

	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 3 (Hisp)	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Sex	-0.114	-31.7	-0.083	-23.3	-0.071	-19.6	-0.020	-5.9	-0.196	-58.8	-0.165	-10.7
Asian- High	-0.004	-0.3	-0.010	-0.6	0.009	0.6	-0.004	-0.3	-0.017	-1.3	0.360	0.7
Asian- Low	-0.142	-2.8	-0.227	-4.9	-0.210	-4.4	-0.279	-6.4	-0.187	-4.5	NI	
Asian-Very Low	-0.183	-6.2	-0.261	-10.2	-0.196	-7.5	-0.279	-11.8	-0.240	-10.5	-0.316	-0.9
Black-High	-0.361	-38.2	-0.558	-58.8	-0.529	-55.6	-0.571	-63.9	-0.462	-55.9	0.097	0.2
Black-Low	-0.400	-22.2	-0.680	-37.4	-0.643	-36.1	-0.703	-40.5	-0.591	-34.7	NI	
Black-Very Low	-0.619	-74.6	-0.838	-101.6	-0.829	-98.8	-0.854	-106.4	-0.712	-89.3	-0.189	-0.6
Hisp-High	-0.214	-28.6	-0.313	-42.2	-0.282	-37.7	-0.347	-49.7	-0.287	-44.2	-0.360	-1.5
Hisp-Low	-0.302	-24.9	-0.435	-36.6	-0.418	-35.3	-0.463	-41.0	-0.385	-35.3	-0.266	-1.1
Hisp-Very Low	-0.435	-61.6	-0.564	-80.7	-0.537	-75.9	-0.595	-88.6	-0.494	-75.3	-0.358	-1.5
Anglo-Low	-0.260	-35.9	-0.315	-44.0	-0.296	-40.6	-0.320	-44.5	-0.260	-35.4	-0.229	-0.9
Anglo-Very Low	-0.147	-12.8	-0.190	-17.1	-0.188	-17.0	-0.233	-21.7	-0.194	-18.0	-0.753	-1.8
Ever LEP	-0.081	-9.0	-0.052	-6.1	-0.013	-1.6	-0.023	-3.1	-0.073	-10.6	-0.088	-0.7
Ever Spec Ed	-0.770	-118.9	-0.427	-55.6	-0.308	-39.7	-0.230	-32.3	-0.195	-29.5	-0.912	-14.7
Spec Ed, yr	-0.090	-2.2	0.069	2.3	-0.137	-4.2	-0.178	-5.6	-0.450	-13.9	-0.289	-1.7
Years Retained	-0.393	-49.2	-0.417	-46.5	-0.335	-33.1	-0.247	-23.6	-0.231	-23.0	-0.273	-11.3
Ever Dbl Promoted	0.086	4.1	0.196	7.3	0.154	4.8	0.030	0.9	-0.011	-0.4	0.079	1.5
Spec Ed, sel	0.935	17.0	0.172	3.6	0.329	7.0	0.060	1.3	0.393	8.8	1.237	3.6
LEP, sel	-0.421	-11.0	-0.368	-8.6	-0.267	-5.0	-0.229	-5.8	-0.185	-5.9	-0.144	-0.6
Other, sel	0.282	7.9	0.356	11.8	0.509	16.2	0.519	18.4	0.698	27.3	-0.124	-0.5
NA-High	-0.100	-1.8	-0.259	-5.1	-0.230	-4.6	-0.152	-3.2	-0.133	-2.9	NI	
NA-Low	-0.246	-1.8	-0.176	-1.2	-0.526	-3.7	0.084	0.7	-0.199	-1.7	-1.124	-1.3
NA-Very Low	-0.301	-5.1	-0.411	-6.7	-0.349	-5.6	-0.365	-5.9	-0.275	-4.5	-0.859	-1.6
Age	0.000	27.6	0.000	27.9	0.000	38.8	0.000	41.9	0.000	45.0	0.000	1.4
Days Absent	NI	NI	-0.011	-30.2	-0.013	-35.9	-0.016	-44.7	-0.013	-35.7	NI	NI
One Year	-0.234	-17.1	-0.046	-2.6	-0.087	-5.0	-0.143	-4.2	-0.071	-5.8	-0.222	-4.4
Two Years	-0.097	-7.3	-0.052	-3.2	-0.117	-6.4	-0.084	-8.0	-0.065	-6.3	-0.171	-3.5
Three Year	-0.050	-4.6	-0.017	-1.1	-0.041	-3.8	-0.015	-1.5	-0.022	-2.3	-0.082	-1.6
Four Years	-0.028	-2.5	-0.014	-1.6	0.023	2.6	0.025	2.9	-0.002	-0.2	-0.085	-1.7
Five Years	-0.060	-7.6	0.001	0.2	0.018	2.4	0.026	3.4	0.029	3.9	-0.098	-3.5
Six Years	-0.044	-7.1	-0.010	-1.8	-0.005	-0.9	-0.003	-0.6	0.002	0.3	0.044	1.8
Constant	-2.316	-24.3	-2.416	-25.3	-3.714	-38.0	-3.809	-40.8	-4.037	-45.3	0.409	1.0
Campus	92		93		94		95		96		92	
Function	F(3144, 220070) = 6.028		F(3146, 224308) = 6.898		F(3026, 225967) = 6.132		F(2068, 234371) = 8.223		F(1654, 238048) = 7.182		F(885, 11583) = 5.163	
Categories	3,145		3,147		3,027		2,069		1,655		886	
Observations	223,245		227,486		229,025		236,471		239,734		12,496	
R^2	0.299		0.315		0.289		0.307		0.331		0.367	

Table A-3. Pooled Level Math Fixed Effects Regressions

	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 3 (Hisp)	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Sex	0.065	17.8	0.021	5.9	0.021	6.0	0.039	11.7	0.023	7.0	-0.015	-0.9
Asian-High	0.089	5.5	0.115	7.6	0.103	6.8	0.125	9.0	0.109	8.3	0.407	0.7
Asian-Low	-0.158	-3.1	-0.034	-0.7	-0.072	-1.5	-0.086	-2.0	-0.076	-1.9	(dropped)	
Asian-Very Low	-0.119	-4.0	-0.003	-0.1	0.015	0.6	0.014	0.6	-0.028	-1.2	-0.004	0.0
Black-High	-0.537	-56.0	-0.638	-68.2	-0.641	-68.2	-0.661	-76.4	-0.661	-81.6	-0.373	-0.9
Black-Low	-0.556	-30.4	-0.738	-40.9	-0.711	-40.3	-0.786	-46.7	-0.789	-47.3	(dropped)	
Black-Very Low	-0.726	-86.3	-0.854	-105.1	-0.867	-104.8	-0.908	-117.6	-0.874	-112.5	0.027	0.1
Hisp-High	-0.314	-41.3	-0.312	-42.7	-0.313	-42.3	-0.372	-55.0	-0.376	-59.0	-0.279	-1.1
Hisp-Low	-0.375	-30.4	-0.398	-33.7	-0.403	-34.4	-0.456	-41.7	-0.454	-42.3	-0.151	-0.6
Hisp-Very Low	-0.501	-70.1	-0.495	-72.0	-0.512	-73.0	-0.582	-89.5	-0.563	-87.5	-0.288	-1.2
Anglo-Low	-0.123	-10.6	-0.151	-13.8	-0.174	-15.9	-0.186	-17.8	-0.207	-19.6	-0.099	-0.2
Anglo-Very Low	-0.237	-32.5	-0.269	-38.2	-0.287	-40.1	-0.286	-41.2	-0.295	-41.0	-0.040	-0.2
Ever LEP	-0.078	-8.5	0.005	0.6	0.031	3.8	0.000	0.0	-0.025	-3.7	-0.140	-1.0
Ever Spec Ed	-0.577	-88.4	-0.455	-62.1	-0.365	-47.9	-0.245	-35.6	-0.223	-34.3	-0.697	-12.8
Spec Ed, yr	0.254	7.0	-0.019	-0.6	-0.318	-8.9	-0.391	-11.0	-0.558	-19.2	-0.032	-0.3
Years Retained	-0.343	-42.6	-0.418	-47.5	-0.347	-34.8	-0.245	-24.3	-0.229	-23.3	-0.250	-10.1
Ever Dbl Promoted	0.070	3.3	0.177	6.7	0.147	4.7	0.005	0.1	-0.012	-0.4	-0.006	-0.1
Spec Ed, sel	-15.600	-8.5	-1.297	-1.2	0.051	0.2	0.114	0.7	2.650	6.1	33.076	2.6
LEP, sel	-0.366	-10.2	-0.516	-13.1	-0.704	-13.4	-0.417	-11.1	-0.386	-12.5	0.235	1.0
Other, sel	0.117	3.5	0.141	5.1	0.091	3.0	0.299	11.0	0.351	13.9	0.224	1.0
NA-High	-0.160	-2.9	-0.212	-4.2	-0.233	-4.7	-0.157	-3.4	-0.171	-3.8	(dropped)	
NA-Low	-0.185	-1.3	-0.404	-2.9	-0.348	-2.4	-0.291	-2.4	-0.188	-1.6	-0.015	0.0
NA-Very Low	-0.454	-7.6	-0.403	-6.7	-0.329	-5.2	-0.395	-6.5	-0.390	-6.3	-1.144	-2.1
Age	0.000	9.5	0.000	38.4	0.001	46.3	0.001	57.6	0.001	60.2	0.000	-3.3
Days Absent	NI	NI	-0.016	-45.8	-0.021	-58.1	-0.022	-61.8	-0.023	-65.2	NI	NI
One Year	-0.211	-15.2	-0.089	-5.3	-0.111	-6.5	-0.218	-6.6	-0.137	-11.3	-0.237	-4.6
Two Years	-0.083	-6.2	-0.090	-5.5	-0.168	-9.3	-0.139	-13.6	-0.109	-10.8	-0.258	-5.3
Three Years	-0.047	-4.3	-0.060	-3.9	-0.138	-13.1	-0.052	-5.4	-0.046	-4.9	-0.220	-4.3
Four Years	-0.051	-4.5	-0.064	-7.6	-0.030	-3.3	-0.002	-0.2	-0.014	-1.7	-0.132	-2.6
Five Years	-0.071	-8.9	-0.030	-4.1	-0.001	-0.1	0.015	2.0	0.011	1.4	-0.166	-5.8
Six Years	-0.047	-7.4	-0.033	-5.6	-0.028	-4.8	-0.014	-2.6	-0.011	-1.9	0.004	0.2
Constant	-0.590	-6.2	-3.131	-33.5	-3.913	-40.7	-4.814	-53.3	-4.899	-56.0	1.369	3.3
Campus	92		93		94		95		96		92	
Function	F(30, 222548) = 1190.40		F(31, 226616) = 1503.87		F(31, 227588) = 1563.86		F(31, 234766) = 2172.03		F(31, 237746) = 2728.88		F(27, 11642) = 36.41	
Categories	3,144		3,148		3,027		2,070		1,658		887	
Observations	225,722		229,795		230,646		236,867		239,435		12,556	
R^2	0.2732		0.3277		0.2999		0.3508		0.3612		0.3259	

Table A-4. Pooled Value Added Reading Fixed Effects Regressions

	Grade 4		Grade 5		Grade 6		Grade 7	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Prior z score	0.596	296.1	0.677	376.8	0.643	371.1	0.636	378.8
Prior est z score	0.584	44.0	0.912	97.9	0.903	114.4	0.986	134.4
Prior Hisp z score	0.395	34.4	NI	NI	NI	NI	NI	NI
Prior est Hisp z score	0.264	5.3	NI	NI	NI	NI	NI	NI
Sex	-0.015	-4.9	-0.015	-5.2	0.023	8.4	-0.192	-73.1
Asian-High	0.030	2.3	0.029	2.4	-0.034	-3.0	-0.003	-0.3
Asian-Low	-0.100	-2.5	-0.009	-0.3	-0.120	-3.5	-0.014	-0.4
Asian-Very Low	-0.085	-3.7	-0.011	-0.5	-0.152	-8.1	-0.050	-2.8
Black-High	-0.335	-41.4	-0.134	-17.8	-0.210	-29.4	-0.080	-12.1
Black-Low	-0.412	-26.6	-0.152	-10.8	-0.253	-18.4	-0.131	-9.7
Black-Very Low	-0.483	-67.2	-0.231	-34.0	-0.293	-44.8	-0.164	-25.5
Hisp-High	-0.187	-29.5	-0.059	-10.1	-0.144	-25.8	-0.047	-9.1
Hisp-Low	-0.267	-26.4	-0.107	-11.5	-0.174	-19.4	-0.070	-8.2
Hisp-Very Low	-0.330	-54.8	-0.134	-23.6	-0.230	-42.5	-0.109	-20.7
Anglo-Low	-0.110	-11.6	-0.047	-5.4	-0.084	-9.9	-0.053	-6.3
Anglo-Very Low	-0.183	-29.8	-0.081	-14.2	-0.130	-22.8	-0.061	-10.5
Ever LEP	-0.015	-2.0	0.022	3.4	0.019	3.3	-0.019	-3.5
Ever Spec Ed	-0.107	-16.1	-0.083	-13.6	-0.061	-10.8	-0.047	-8.9
Spec Ed, yr	0.450	16.4	-0.039	-1.5	0.030	1.2	-0.109	-4.2
Years Retained	-0.261	-33.7	-0.083	-10.4	-0.061	-7.3	-0.054	-6.9
Ever Dbl Promoted	0.161	6.9	0.042	1.7	-0.004	-0.1	-0.029	-1.2
Spec Ed, sel	0.166	3.9	0.250	6.7	-0.139	-3.7	0.126	3.5
LEP, sel	0.421	11.8	0.182	4.3	0.044	1.4	0.065	2.6
Other, sel	0.640	25.8	0.316	12.7	0.215	9.5	0.336	16.6
NA-High	-0.168	-3.8	-0.062	-1.6	-0.018	-0.5	-0.036	-1.0
NA-Low	0.258	2.1	-0.282	-2.5	0.086	0.9	0.111	1.2
NA-Very Low	-0.331	-6.3	-0.100	-2.0	-0.121	-2.5	-0.105	-2.2
Age	0.000	15.3	0.000	25.0	0.000	17.8	0.000	20.8
Days Absent	NI	NI	-0.005	-16.2	-0.007	-24.5	-0.003	-8.7
One Year	0.112	7.7	-0.044	-3.3	-0.077	-2.9	0.035	3.6
Two Years	0.045	3.2	-0.065	-4.5	0.004	0.5	-0.014	-1.7
Three Years	0.053	4.0	-0.032	-3.8	0.016	2.1	-0.008	-1.0
Four Years	0.036	4.9	0.031	4.3	0.007	1.0	-0.014	-2.3
Five Years	0.029	4.6	0.008	1.4	0.015	2.4	0.007	1.3
Six Years	0.003	0.6	-0.001	-0.3	-0.006	-1.4	0.000	0.1
Constant	-1.654	-20.5	-2.074	-27.0	-1.311	-17.5	-1.532	-21.7
Campus	93		94		95		96	
Function	F(34, 219357)= 4344.8		F(33, 225965)= 6593.39		F(33, 234369)= 6961.72		F(33, 238046)= 8317.21	
Categories	3,146		3,027		2,069		1,655	
Observations	222,537		229,025		236,471		239,734	
R^2	0.5083		0.5641		0.5652		0.5859	

Table A-5. Pooled Value Added Math Fixed Effects Regressions

	Grade 4		Grade 5		Grade 6		Grade 7	
Variable	Coef	t	Coef	t	Coef	t	Coef	t
Prior z score	0.573	304.5	0.727	431.7	0.715	477.8	0.770	532.8
Prior est z score	0.585	41.2	0.923	102.9	0.969	134.9	1.007	168.5
Prior Hisp z score	0.511	44.7	NI	NI	NI	NI	NI	NI
Prior est Hisp z score	0.460	7.7	NI	NI	NI	NI	NI	NI
Sex	-0.011	-3.8	0.006	2.3	0.018	7.4	-0.019	-8.8
Asian-High	0.109	8.5	0.027	2.4	0.025	2.5	0.029	3.2
Asian-Low	0.081	2.0	0.015	0.4	-0.080	-2.7	-0.036	-1.3
Asian-Very Low	0.129	5.8	0.025	1.3	-0.016	-1.0	-0.037	-2.5
Black-High	-0.313	-39.0	-0.165	-23.3	-0.185	-29.7	-0.128	-23.0
Black-Low	-0.370	-24.2	-0.163	-12.4	-0.234	-19.5	-0.166	-14.7
Black-Very Low	-0.438	-61.4	-0.214	-33.7	-0.261	-45.9	-0.174	-32.3
Hisp-High	-0.134	-21.4	-0.077	-14.0	-0.128	-26.4	-0.076	-17.5
Hisp-Low	-0.179	-17.9	-0.098	-11.3	-0.148	-18.9	-0.081	-11.2
Hisp-Very Low	-0.232	-39.1	-0.137	-26.0	-0.201	-42.8	-0.113	-25.6
Anglo-Low	-0.096	-10.3	-0.050	-6.2	-0.051	-6.9	-0.073	-10.2
Anglo-Very Low	-0.164	-27.5	-0.092	-17.2	-0.080	-16.2	-0.080	-16.5
Ever LEP	0.040	5.6	0.029	4.8	0.006	1.2	0.022	4.7
Ever Spec Ed	-0.180	-28.6	-0.111	-19.6	-0.038	-7.6	-0.040	-9.1
Spec Ed, yr	0.406	15.6	-0.099	-3.7	0.000	0.0	-0.122	-6.2
Years Retained	-0.285	-37.9	-0.094	-12.6	-0.038	-5.2	-0.020	-3.0
Ever Dbl Promoted	0.144	6.3	0.053	2.3	-0.021	-0.9	-0.008	-0.4
Spec Ed, sel	-0.960	-1.0	-0.407	-1.9	-0.197	-1.6	1.371	4.6
LEP, sel	0.252	7.6	-0.113	-2.9	0.053	2.0	0.002	0.1
Other, sel	0.525	22.8	0.045	2.0	0.238	12.3	0.156	9.1
NA-High	-0.098	-2.3	-0.069	-1.9	-0.007	-0.2	-0.065	-2.2
NA-Low	-0.235	-2.0	-0.105	-1.0	-0.059	-0.7	-0.026	-0.3
NA-Very Low	-0.188	-3.7	-0.111	-2.4	-0.119	-2.8	-0.141	-3.4
Age	0.000	43.0	0.000	24.2	0.000	28.4	0.000	20.8
Days absent	NI	NI	-0.008	-29.5	-0.006	-21.9	-0.006	-24.7
One Year	0.057	4.0	-0.026	-2.1	-0.125	-5.4	0.066	8.1
Two Years	0.005	0.4	-0.085	-6.4	-0.005	-0.7	-0.008	-1.1
Three Years	0.003	0.2	-0.091	-11.5	0.039	5.7	-0.011	-1.7
Four Years	-0.005	-0.7	0.010	1.6	0.008	1.3	-0.020	-3.8
Five Years	0.006	1.0	0.006	1.2	0.005	0.9	-0.004	-0.9
Six Years	-0.019	-3.8	-0.011	-2.4	-0.004	-0.9	-0.006	-1.5
Constant	-3.654	-46.5	-1.609	-22.4	-1.856	-28.6	-1.206	-20.2
Campus	93		94		95		96	
Function	F(34, 221937)= 4516.85		F(33, 227586)= 8337.97		F(33, 234764)= 11001.72		F(33, 237744)= 14307.33	
Categories	3,147		3,027		2,070		1,658	
Observations	225,118		230,646		236,867		239,435	
R^2	0.522		0.6156		0.672		0.7099	

Table A-6. Level Black Reading School Quality Regressions

	Grade 7							
	Base		Alt 1		Alt 2		Alt 3	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Campus Avg z score	NI	NI	0.568	30.8	NI	NI	0.191	5.4
Z score - Level Pred	NI	NI	NI	NI	0.993	32.9	0.727	12.7
Sex	-0.308	-23.8	-0.306	-24.2	-0.302	-23.9	-0.303	-24.0
Black-Low	-0.148	-5.8	-0.120	-4.8	-0.134	-5.4	-0.128	-5.1
Black-Very Low	-0.295	-21.5	-0.206	-15.0	-0.243	-18.0	-0.227	-16.5
Ever LEP	0.155	1.9	0.134	1.7	0.126	1.6	0.127	1.6
Ever Spec Ed	-0.304	-11.0	-0.322	-11.9	-0.302	-11.2	-0.308	-11.4
Spec Ed, yr	-0.609	-17.0	-0.640	-18.2	-0.647	-18.4	-0.647	-18.4
Years Retained	-0.289	-8.8	-0.250	-7.8	-0.272	-8.5	-0.263	-8.2
Ever Dbl Promoted	0.070	0.8	0.057	0.6	0.041	0.5	0.044	0.5
Age	0.001	17.7	0.001	17.6	0.001	17.9	0.001	17.8
Days Absent	-0.024	-19.3	-0.019	-15.4	-0.020	-16.5	-0.019	-15.9
One Year	-0.064	-1.4	-0.140	-3.1	-0.122	-2.7	-0.132	-2.9
Two Years	-0.024	-0.6	-0.070	-1.9	-0.059	-1.6	-0.065	-1.8
Three Years	0.001	0.0	-0.026	-0.7	-0.016	-0.5	-0.021	-0.6
Four Years	0.073	2.3	0.025	0.8	0.030	1.0	0.026	0.8
Five Years	0.043	1.5	0.011	0.4	0.020	0.7	0.015	0.6
Six Years	0.009	0.4	-0.015	-0.7	-0.018	-0.9	-0.019	-0.9
Constant	-5.390	-16.8	-5.248	-16.7	-5.302	-16.9	-5.279	-16.9
Observations	22,343		22,332		22,332		22,332	
Function	F(16, 22326)= 291.32		F(17, 22314)= 340.76		F(17, 22314)= 350.45		F(18, 22313)= 333.06	
R^2	0.1727		0.2061		0.2107		0.2118	

Table A-7. Level Black Math School Quality Regressions

Grade 3

Variable	Base Coef.	t	Alt 1 Coef.	t	Alt 2 Coef.	t	Alt 3 Coef.	t
Campus Avg z score	NI	NI	0.749	49.6	NI	NI	0.024	0.8
Z score - Level Pred	NI	NI	NI	NI	0.969	57.0	0.945	26.6
Sex	0.008	0.6	0.010	0.8	0.008	0.6	0.008	0.6
Black-Low	-0.052	-1.8	0.026	1.0	-0.030	-1.1	-0.028	-1.0
Black-Very Low	-0.202	-13.0	-0.063	-4.2	-0.170	-11.7	-0.166	-10.9
Ever LEP	0.108	1.3	0.092	1.1	0.062	0.8	0.063	0.8
Ever Spec Ed	-0.706	-28.7	-0.727	-31.1	-0.699	-30.4	-0.700	-30.4
Spec Ed, yr	0.021	0.6	0.030	0.9	0.021	0.6	0.022	0.6
Years Retained	-0.299	-12.1	-0.256	-10.9	-0.298	-12.9	-0.296	-12.8
Ever Dbl Promoted	0.029	0.5	0.057	0.9	0.040	0.7	0.040	0.7
Age	0.000	3.0	0.000	4.3	0.000	3.6	0.000	3.7
Days Absent	-0.015	-12.1	-0.010	-8.4	-0.012	-10.8	-0.012	-10.7
One Year	-0.217	-4.2	-0.211	-4.3	-0.186	-3.9	-0.187	-3.9
Two Years	-0.017	-0.3	-0.047	-1.0	-0.012	-0.3	-0.013	-0.3
Three Years	-0.038	-0.9	-0.075	-1.9	-0.036	-0.9	-0.037	-0.9
Four Years	-0.052	-1.2	-0.057	-1.3	-0.037	-0.9	-0.037	-0.9
Five Years	-0.078	-2.6	-0.103	-3.7	-0.073	-2.6	-0.074	-2.7
Six Years	-0.019	-0.8	-0.037	-1.7	-0.026	-1.2	-0.027	-1.3
Constant	-0.922	-2.9	-1.274	-4.2	-1.119	-3.7	-1.125	-3.7
Observations	22,602		22,601		22,601		22,601	
Function	F(16, 22585)= 146.09		F(17, 22583)= 297.39		F(17, 22583)= 348.27		F(18, 22582)= 328.95	
R^2	0.0938		0.1829		0.2077		0.2077	

Grade 4

Variable	Base Coef.	t	Alt 1 Coef.	t	Alt 2 Coef.	t	Alt 3 Coef.	t
Campus Avg z score	NI	NI	0.626	46.4	NI	NI	0.073	3.0
Z score - Level Pred	NI	NI	NI	NI	0.945	54.6	0.866	27.8
Sex	-0.036	-2.8	-0.028	-2.3	-0.030	-2.5	-0.030	-2.5
Black-Low	-0.149	-5.6	-0.077	-3.0	-0.111	-4.4	-0.106	-4.2
Black-Very Low	-0.252	-17.7	-0.117	-8.4	-0.213	-15.9	-0.200	-14.4
Ever LEP	0.191	2.2	0.170	2.1	0.172	2.1	0.171	2.1
Ever Spec Ed	-0.597	-23.1	-0.612	-24.8	-0.579	-23.9	-0.582	-24.0
Spec Ed, yr	0.039	1.1	0.024	0.7	0.013	0.4	0.013	0.4
Years Retained	-0.367	-14.1	-0.336	-13.5	-0.377	-15.5	-0.373	-15.3
Ever Dbl Promoted	0.137	1.8	0.131	1.8	0.100	1.4	0.103	1.4
Age	0.000	13.4	0.001	14.8	0.000	14.5	0.001	14.6
Days Absent	-0.021	-18.3	-0.016	-14.4	-0.018	-17.0	-0.018	-16.6
One Year	0.029	0.5	-0.014	-0.3	-0.007	-0.1	-0.009	-0.2
Two Years	-0.007	-0.1	-0.026	-0.5	-0.015	-0.3	-0.016	-0.3
Three Years	-0.118	-2.2	-0.144	-2.8	-0.115	-2.2	-0.119	-2.3
Four Years	-0.006	-0.2	-0.042	-1.4	-0.007	-0.2	-0.011	-0.4
Five Years	-0.027	-1.1	-0.066	-2.7	-0.046	-1.9	-0.049	-2.0
Six Years	-0.005	-0.2	-0.033	-1.7	-0.029	-1.5	-0.030	-1.6
Constant	-4.159	-13.4	-4.378	-14.8	-4.274	-14.7	-4.290	-14.7
Observations	22,213		22,207		22,207		22,207	
Function	F(16, 22196)= 187.7		F(17, 22189)= 320.19		F(17, 22189)= 375.94		F(18, 22188)= 355.69	
R^2	0.1192		0.197		0.2236		0.2239	

Table A-7. Level Black Math School Quality Regressions

Grade 5

	Base		Alt 1		Alt 2		Alt 3	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Campus Avg z score	NI	NI	0.576	36.3	NI	NI	0.054	2.2
Z score - Level Pred	NI	NI	NI	NI	0.932	45.4	0.876	26.5
Sex	-0.029	-2.2	-0.027	-2.1	-0.029	-2.3	-0.029	-2.3
Black-Low	-0.112	-4.2	-0.048	-1.8	-0.073	-2.8	-0.069	-2.7
Black-Very Low	-0.252	-17.3	-0.126	-8.6	-0.214	-15.3	-0.204	-13.9
Ever LEP	0.377	4.0	0.322	3.5	0.335	3.7	0.332	3.7
Ever Spec Ed	-0.517	-17.8	-0.546	-19.3	-0.501	-18.0	-0.504	-18.1
Spec Ed, yr	-0.092	-2.4	-0.104	-2.8	-0.131	-3.6	-0.130	-3.5
Years Retained	-0.322	-10.6	-0.301	-10.2	-0.343	-11.8	-0.339	-11.7
Ever Dbl Promoted	0.097	1.1	0.107	1.2	0.052	0.6	0.055	0.6
Age	0.001	16.3	0.001	17.5	0.001	17.9	0.001	17.9
Days Absent	-0.024	-20.3	-0.019	-16.9	-0.022	-19.3	-0.022	-18.9
One Year	-0.131	-2.8	-0.125	-2.8	-0.147	-3.3	-0.146	-3.3
Two Years	-0.244	-3.8	-0.265	-4.2	-0.272	-4.4	-0.272	-4.4
Three Years	-0.204	-5.0	-0.244	-6.2	-0.211	-5.4	-0.214	-5.5
Four Years	0.048	1.4	0.012	0.3	0.043	1.3	0.040	1.2
Five Years	-0.007	-0.3	-0.035	-1.3	-0.022	-0.8	-0.023	-0.9
Six Years	-0.014	-0.7	-0.036	-1.8	-0.031	-1.5	-0.032	-1.6
Constant	-5.323	-16.3	-5.540	-17.5	-5.606	-18.0	-5.609	-18.0
Observations	22,494		22,488		22,488		22,488	
Function	F(16, 22477)= 182.77		F(17, 22470)= 259.87		F(17, 22470)= 309.04		F(18, 22469)= 292.17	
R^2	0.1151		0.1643		0.1895		0.1897	

Grade 6

	Base		Alt 1		Alt 2		Alt 3	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Campus Avg z score	NI	NI	0.546	36.9	NI	NI	0.120	4.9
Z score - Level Pred	NI	NI	NI	NI	0.938	42.8	0.794	21.7
Sex	-0.044	-3.6	-0.044	-3.6	-0.044	-3.7	-0.044	-3.7
Black-Low	-0.147	-5.9	-0.099	-4.1	-0.121	-5.0	-0.114	-4.7
Black-Very Low	-0.271	-20.0	-0.177	-13.2	-0.244	-18.8	-0.228	-17.0
Ever LEP	0.179	2.2	0.159	2.0	0.158	2.0	0.157	2.0
Ever Spec Ed	-0.339	-12.2	-0.376	-14.0	-0.345	-13.0	-0.352	-13.2
Spec Ed, yr	-0.349	-9.5	-0.351	-9.8	-0.352	-10.0	-0.352	-10.0
Years Retained	-0.292	-9.2	-0.240	-7.8	-0.256	-8.4	-0.251	-8.2
Ever Dbl Promoted	-0.008	-0.1	-0.003	0.0	-0.030	-0.3	-0.025	-0.3
Age	0.001	22.1	0.001	22.2	0.001	22.2	0.001	22.2
Days Absent	-0.028	-23.9	-0.023	-19.9	-0.024	-21.8	-0.024	-21.1
One Year	-0.198	-1.9	-0.282	-2.7	-0.272	-2.7	-0.279	-2.7
Two Years	-0.174	-5.0	-0.193	-5.7	-0.170	-5.0	-0.174	-5.2
Three Years	-0.128	-3.6	-0.156	-4.5	-0.134	-3.9	-0.139	-4.1
Four Years	0.008	0.2	-0.025	-0.8	-0.001	0.0	-0.007	-0.2
Five Years	0.028	1.0	-0.007	-0.3	0.011	0.4	0.006	0.2
Six Years	-0.043	-2.2	-0.048	-2.5	-0.035	-1.8	-0.037	-2.0
Constant	-6.833	-22.0	-6.654	-22.1	-6.603	-22.1	-6.599	-22.1
Observations	22,346		22,338		22,338		22,338	
Function	F(16, 22329)= 231.5		F(17, 22320)= 310.84		F(17, 22320)= 343.19		F(18, 22319)= 325.77	
R^2	0.1423		0.1914		0.2072		0.2081	

Table A-7. Level Black Math School Quality Regressions

	Grade 7							
	Base		Alt 1		Alt 2		Alt 3	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Campus Avg z score	NI	NI	0.520	33.2	NI	NI	0.136	4.8
Z score - Level Pred	NI	NI	NI	NI	1.030	36.8	0.825	16.2
Sex	-0.063	-5.1	-0.062	-5.1	-0.061	-5.0	-0.061	-5.1
Black-Low	-0.138	-5.6	-0.110	-4.6	-0.120	-5.1	-0.117	-4.9
Black-Very Low	-0.241	-18.3	-0.155	-11.9	-0.197	-15.4	-0.183	-14.0
Ever LEP	0.292	3.7	0.268	3.4	0.280	3.6	0.276	3.6
Ever Spec Ed	-0.328	-12.4	-0.351	-13.6	-0.329	-12.8	-0.335	-13.1
Spec Ed, yr	-0.510	-14.9	-0.539	-16.1	-0.542	-16.3	-0.543	-16.3
Years Retained	-0.262	-8.4	-0.215	-7.0	-0.231	-7.6	-0.225	-7.4
Ever Dbl Promoted	-0.087	-1.0	-0.097	-1.2	-0.112	-1.3	-0.110	-1.3
Age	0.001	22.4	0.001	22.6	0.001	22.8	0.001	22.8
Days Absent	-0.029	-24.5	-0.024	-20.6	-0.025	-21.9	-0.025	-21.3
One Year	-0.154	-3.5	-0.230	-5.3	-0.200	-4.7	-0.210	-4.9
Two Years	-0.132	-3.6	-0.176	-5.0	-0.160	-4.6	-0.166	-4.7
Three Years	-0.052	-1.5	-0.080	-2.3	-0.066	-1.9	-0.071	-2.1
Four Years	0.033	1.1	-0.016	-0.5	-0.008	-0.3	-0.013	-0.4
Five Years	0.025	0.9	-0.005	-0.2	0.007	0.3	0.003	0.1
Six Years	-0.009	-0.4	-0.029	-1.4	-0.026	-1.3	-0.028	-1.4
Constant	-6.843	-22.3	-6.710	-22.4	-6.746	-22.6	-6.731	-22.6
Observations	22,359		22,346		22,346		22,346	
Function	F(16, 22342)= 272.82		F(17, 22328)= 333.64		F(17, 22328)= 351.19		F(18, 22327)= 333.28	
R^2	0.1634		0.2026		0.211		0.2118	

Table A-8. Value Added Black Reading School Quality Regressions

	Grade 4							
	Base		Alt 1		Alt 2		Alt 3	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Prior z score	0.542	88.9	0.523	87.0	0.544	92.0	0.538	90.0
Prior est z score	0.667	20.1	0.663	20.4	0.670	20.9	0.669	20.8
Campus Avg z score	NI	NI	0.385	30.2	NI	NI	0.104	5.8
Z score - Level Pred	NI	NI	NI	NI	0.751	37.2	0.633	22.0
Sex	-0.071	-6.4	-0.070	-6.5	-0.070	-6.5	-0.070	-6.5
Black-Low	-0.113	-5.1	-0.066	-3.0	-0.087	-4.0	-0.079	-3.6
Black-Very Low	-0.165	-13.5	-0.082	-6.7	-0.149	-12.6	-0.129	-10.5
Ever LEP	-0.138	1.9	0.132	1.9	0.142	2.0	0.140	2.0
Ever Spec Ed	-0.170	-7.4	-0.199	-8.8	-0.174	-7.8	-0.181	-8.1
Spec Ed, yr	0.043	1.4	0.044	1.4	0.042	1.4	0.043	1.4
Years Retained	-0.170	-7.6	-0.162	-7.4	-0.183	-8.5	-0.179	-8.3
Ever Dbl Promoted	0.277	4.3	0.285	4.5	0.276	4.4	0.278	4.4
Age	0.000	7.2	0.000	8.2	0.000	7.9	0.000	8.0
Days Absent	-0.011	-11.7	-0.009	-9.0	-0.011	-11.2	-0.010	-10.5
One Year	0.146	3.0	0.125	2.6	0.128	2.7	0.124	2.6
Two Years	0.071	1.5	0.061	1.3	0.055	1.2	0.055	1.2
Three Years	0.018	0.4	-0.010	-0.2	0.015	0.3	0.008	0.2
Four Years	0.078	3.0	0.055	2.1	0.076	3.0	0.070	2.7
Five Years	0.031	1.4	0.004	0.2	0.020	1.0	0.015	0.7
Six Years	0.033	1.9	0.014	0.8	0.022	1.3	0.018	1.1
Constant	-1.958	-7.4	-2.166	-8.4	-2.063	-8.1	-2.103	-8.2
Observations	21,941		21,934		21,934		21,934	
Function	F(18,		F(19,		F(19,		F(20,	
	21922)=		21914)=		21914)=		21913)=	
	676.48		715.48		753.87		718.9	
R^2	0.3571		0.3828		0.3953		0.3962	

	Grade 5							
	Base		Alt 1		Alt 2		Alt 3	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Prior z score	0.682	112.9	0.667	110.9	0.693	116.7	0.689	113.5
Prior est z score	0.887	30.6	0.878	30.6	0.904	31.8	0.900	31.6
Campus Avg z score	NI	NI	0.289	21.7	NI	NI	0.063	3.6
Z score - Level Pred	NI	NI	NI	NI	0.701	29.3	0.626	19.9
Sex	-0.059	-5.5	-0.060	-5.7	-0.060	-5.7	-0.060	-5.8
Black-Low	-0.047	.2-2	-0.015	-0.7	-0.032	-1.5	-0.026	-1.3
Black-Very Low	-0.134	-11.4	-0.066	-5.4	-0.098	-8.5	-0.087	-7.3
Ever LEP	0.231	3.0	0.197	2.6	0.187	2.5	0.184	2.5
Ever Spec Ed	-0.200	-8.6	-0.222	-9.6	-0.195	-8.5	-0.200	-8.7
Spec Ed, yr	-0.038	-1.2	-0.046	-1.4	-0.045	-1.4	-0.045	-1.5
Years Retained	-0.084	-3.4	-0.078	-3.3	-0.087	-3.6	-0.086	-3.6
Ever Dbl Promoted	-0.067	-0.9	-0.045	-0.6	-0.043	-0.6	-0.041	-0.6
Age	0.000	7.5	0.000	8.2	0.000	8.2	0.000	8.3
Days Absent	-0.008	-8.0	-0.006	-6.1	-0.007	-7.1	-0.006	-6.8
One Year	0.042	1.1	0.047	1.2	0.039	1.0	0.040	1.1
Two Years	0.012	0.2	-0.014	-0.3	-0.032	-0.6	-0.033	-0.6
Three Years	0.020	0.6	0.004	-0.1	0.015	0.5	0.011	0.3
Four Years	0.048	1.7	0.025	0.9	0.037	1.4	0.033	1.2
Five Years	0.004	0.2	-0.015	-0.7	-0.011	-0.5	-0.014	-0.6
Six Years	0.018	1.1	0.004	0.2	0.006	0.4	0.005	0.3
Constant	-1.903	-7.3	-2.074	-8.0	-2.071	-8.1	-2.089	-8.2
Observations	22,279		22,273		22,273		22,273	
Function	F(18,		F(19,		F(19,		F(20,	
	22260)=		22253)=		22253)=		22252)=	
	993.36		985.31		1022.29		972.36	
R^2	0.4454		0.4569		0.4661		0.4664	

Table A-8. Value Added Black Reading School Quality Regressions

Grade 6

	Base		Alt 1		Alt 2		Alt 3	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Prior z score	0.624	113.1	0.611	111.5	0.633	117.7	0.630	115.5
Prior est z score	0.799	32.2	0.781	31.9	0.804	33.3	0.801	33.1
Campus Avg z score	NI	NI	0.328	24.9	NI	NI	0.049	2.9
Z score - Level Pred	NI	NI	NI	NI	0.815	35.3	0.758	24.8
Sex	-0.045	-4.5	-0.047	-4.7	-0.046	-4.6	-0.046	-4.7
Black-Low	-0.062	-3.1	-0.031	-1.6	-0.056	-2.8	-0.051	-2.6
Black-Very Low	-0.093	-8.4	-0.038	-3.4	-0.086	-8.0	-0.079	-7.1
Ever LEP	0.121	1.8	0.112	1.7	0.115	1.8	0.114	1.8
Ever Spec Ed	-0.085	-3.8	-0.109	-4.9	-0.093	-4.2	-0.096	-4.4
Spec Ed, yr	-0.087	-2.8	-0.104	-3.4	-0.083	-2.8	-0.086	-2.9
Years Retained	-0.107	-4.2	-0.086	-3.4	-0.091	-3.7	-0.089	-3.6
Ever Dbl Promoted	0.049	0.7	0.041	0.6	0.031	0.4	0.032	0.5
Age	0.000	8.0	0.000	8.2	0.000	7.4	0.000	7.5
Days Absent	-0.011	-11.4	-0.008	-8.8	-0.009	-9.9	-0.009	-9.6
One Year	-0.079	-0.9	-0.119	-1.4	-0.098	-1.2	-0.103	-1.2
Two Years	0.080	2.7	0.061	2.1	0.086	3.0	0.083	2.9
Three Years	-0.044	-1.5	-0.057	-2.0	-0.037	-1.3	-0.039	-1.4
Four Years	0.022	0.9	0.000	0.0	0.016	0.6	0.013	0.5
Five Years	0.005	0.2	-0.017	-0.8	-0.005	-0.3	-0.008	-0.4
Six Years	-0.045	-2.8	-0.054	-3.4	-0.044	-2.8	-0.046	-2.9
Constant	-1.949	-7.8	-1.965	-7.9	-1.773	-7.2	-1.788	-7.3
Observations	22,376		22,369		22,369		22,369	
Function	F(18, 22357)= 1003.71		F(19, 22349)= 1010.76		F(19, 22349)= 1070.27		F(20, 22348)= 1017.5	
R^2	0.4469		0.4622		0.4764		0.4766	

Grade 7

	Base		Alt 1		Alt 2		Alt 3	
Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Prior z score	0.691	123.1	0.677	120.0	0.688	123.6	0.683	120.9
Prior est z score	0.973	41.7	0.952	40.9	0.975	42.1	0.966	41.6
Campus Avg z score	NI	NI	0.258	18.0	NI	NI	0.105	5.4
Z score - Level Pred	NI	NI	NI	NI	0.643	20.7	0.488	11.5
Sex	-0.227	-22.8	-0.228	-23.1	-0.225	-22.8	-0.226	-22.9
Black-Low	-0.051	-2.6	-0.041	-2.1	-0.054	-2.8	-0.049	-2.5
Black-Very Low	-0.089	-8.3	-0.053	-4.9	-0.081	-7.6	-0.068	-6.3
Ever LEP	0.097	1.5	0.088	1.4	0.090	1.4	0.088	1.4
Ever Spec Ed	-0.064	-3.0	-0.078	-3.7	-0.063	-3.0	-0.069	-3.3
Spec Ed, yr	-0.214	-7.4	-0.236	-8.2	-0.227	-7.9	-0.233	-8.1
Years Retained	-0.106	-4.2	-0.092	-3.7	-0.100	-4.0	-0.096	-3.8
Ever Dbl Promoted	0.080	1.1	0.068	1.0	0.046	0.7	0.049	0.7
Age	0.000	7.3	0.000	7.4	0.000	7.5	0.000	7.5
Days Absent	-0.006	-6.2	-0.004	-4.4	-0.005	-5.1	-0.004	-4.6
One Year	0.117	4.8	0.137	3.8	0.158	4.3	0.147	4.0
Two Years	0.012	0.6	-0.004	-0.1	0.003	0.1	-0.002	-0.1
Three Years	0.037	1.3	0.024	0.9	0.025	0.9	0.023	0.8
Four Years	0.031	1.3	0.011	0.4	0.016	0.7	0.011	0.5
Five Years	0.034	1.6	0.020	0.9	0.026	1.2	0.022	1.0
Six Years	0.015	0.9	0.004	0.3	0.003	0.2	0.002	0.1
Constant	-1.621	-6.5	-1.626	-6.6	-1.646	-6.7	-1.646	-6.7
Observations	22,343		22,332		22,332		22,332	
Function	F(18, 22324)= 1293.31		F(19, 22312)= 1258.66		F(19, 22312)= 1270.07		F(20, 22311)= 1209.5	
R^2	0.5105		0.5174		0.5196		0.5202	

Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Prior z score	0.512	86.0	0.490	84.9	0.527	89.7	0.508	86.5
Prior est z score	0.673	19.1	0.677	19.9	0.677	18.6	0.680	18.9
Campus Avg z score	NI	NI	0.474	40.2	NI	NI	0.314	21.2
Z score - Level Pred	NI	NI	NI	NI	0.735	37.6	0.430	17.8
Sex	-0.046	-4.1	-0.040	-3.7	-0.044	-4.0	-0.041	-3.7
Black-Low	-0.104	-4.5	-0.051	-2.3	-0.071	-3.1	-0.050	-2.3
Black-Very Low	-0.148	-12.0	-0.050	-4.1	-0.113	-9.3	-0.062	-5.0
Ever LEP	0.162	2.2	0.152	2.1	0.158	2.2	0.144	2.0
Ever Spec Ed	-0.283	-12.3	-0.308	-13.8	-0.277	-12.1	-0.292	-12.8
Spec Ed, yr	0.046	1.5	0.036	1.2	0.083	2.6	0.077	2.4
Years Retained	-0.238	-10.5	-0.221	-10.2	-0.260	-11.5	-0.242	-10.8
Ever Dbl Promoted	0.134	2.0	0.131	2.0	0.169	2.5	0.163	2.5
Age	0.000	13.4	0.000	14.7	0.000	13.9	0.000	14.4
Days Absent	-0.014	-14.3	-0.011	-11.0	-0.013	-12.6	-0.011	-10.8
One Year	0.237	4.7	0.210	4.3	0.242	4.8	0.235	4.7
Two Years	0.112	2.3	0.101	2.1	0.095	2.0	0.096	2.0
Three Years	-0.042	-0.9	-0.061	-1.3	-0.043	-0.9	-0.049	-1.1
Four Years	0.072	2.6	0.047	1.7	0.048	1.7	0.040	1.5
Five Years	0.025	1.1	-0.004	-0.2	0.014	0.6	0.000	0.0
Six Years	0.016	0.9	-0.005	-0.3	0.005	0.3	-0.002	-0.1
Constant	-3.624	-13.5	-3.827	-14.7	-3.729	-14.0	-3.813	-14.5
Observations	22,213		22,207		21,431		21,431	
Function	F(18, 22194)= 636.27		F(19, 22187)= 732.09					

Variable	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Prior z score	0.708	146.1	0.694	146.4	0.721	151.9	0.708	149.2
Prior est z score	0.890	42.2	0.880	42.7	0.903	42.6	0.891	42.4
Campus Avg z score	NI	NI	0.369	34.8	NI	NI	0.245	20.7
Z score - Level Pred	NI	NI	NI	NI	0.748	36.2	0.529	22.9
Sex	-0.033	-3.6	-0.032	-3.7	-0.031	-3.6	-0.031	-3.6
Black-Low	-0.051	-2.8	-0.020	-1.1	-0.045	-2.6	-0.025	-1.5