

The Incentive Effects of the Top 10% Plan

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This version: June 14, 2012

Abstract

This paper investigates the incentive effects of the Top 10% Plan on high school students' academic achievement. The Top 10% Plan substantially improved the probability of admissions to state flagship public universities for students from low-performing Texas high schools. We find that under the Top 10% policy, low-performing high schools – 1st, 2nd, 3rd, and 4th quintiles in the school achievement distribution – experience a larger increase in academic achievement, as measured by 10th-grade TAAS pass rates, relative to schools in the top quintile. Furthermore, this pattern holds for students of all races. Sensitivity analyses show that our findings are not a result of pre-existing trends, school accountability requirements, or strategic choice of high schools.

JEL Classifications: H31, I21, I28, J15, J24

Keywords: Incentives; College Admissions; Top 10% Plan; Student Academic Achievement.

*We are grateful to Andrew I. Friedson, Rick Hanushek, Larry Katz, Jeffrey D. Kubik, Sally Kwak, Bridget Terry Long, Richard Murnane, and seminar participants at AEFP annual conference and Peking University for encouragement and helpful comments and discussions, and to Katie Fitzpatrick for excellent research assistance. We are particularly grateful to Julie Berry Cullen for sharing her Stata macro programs for extracting the Academic Excellence Indicator System data of the Texas Education Agency. We acknowledge financial support from the Maxwell School of Citizenship and Public Affairs at Syracuse University. Institutional support from the Center of Policy Research at the Maxwell School of Citizenship and Public Affairs, Harvard University, and the National Bureau of Economic Research (NBER) are also gratefully acknowledged. Part of the research was completed while Cortes was a Visiting Assistant Professor at Harvard Graduate School of Education and Visiting Scholar at NBER and Zhang was an Assistant Professor of Economics at Clemson University.

1. Introduction

The role that incentives play in raising educational outcomes has attracted significant interests from policy makers and researchers around the world. Countries have implemented various policy initiatives and small-scale, randomized experiments that are designed to motivate educators and students to attain higher achievement. These incentive programs have generally been found to have positive impacts on student achievement. This paper studies the incentive effects on high school students' academic achievement of greater probability of admissions to a state flagship university that are brought about by the Texas Top 10% Plan.

In 1997 Texas passed the H.B.588 bill, commonly known as the Top 10% Plan; this policy changed the nature of college admissions for all Texas students. The Top 10% Plan guarantees automatic college admissions to all high school seniors who graduate in the top decile of their school's graduating class; more importantly, rank-eligible students can choose to attend *any* one of the Texas public four-year higher education institutions.¹ Under the Top 10% Plan, college-bound high school students who plan to attend an in-state public university compete first and foremost with only peers in their own high school. Prior to the Top 10% policy, students competed with all high school seniors in the state. The change in the pool of competitors is most dramatic for students attending low-performing high schools. In other words, before the Top 10% policy, students from low-performing high schools competed with all seniors in Texas, thus having a relatively low probability of a college admission. In contrast, under the Top 10% policy, these students now only compete with fellow students in their graduating senior class, and now the probability of a college admission is 10 percent. This, combined with the unique feature of "institution choice" in the Texas policy, substantially increased the probability of admissions to a high-quality public in-state institution for students from low-performing high schools. Since the introduction of the Top 10%

¹ College choice is unique to Texas. Other states that have implemented a percent plan (i.e., California and Florida) assign an institution to rank-eligible students.

Plan, there has been a dramatic rise in the number of high schools that send graduates to state flagship universities; these high schools are also more diverse in geographic and socio-economic characteristics (Long et al. 2010). Due to higher returns of attending a flagship university,² the Top 10% Plan may induce students from low-performing high schools to work harder. As a result, we expect measures of their high school achievement to improve.

This paper investigates the incentive impact of the Top 10% Plan on the academic achievement of high school students. We use school-level data assembled from the Texas Education Agency (TEA) and estimate the average impact of the Top 10% Plan on the academic achievement of all students in a given year. We conduct the analysis in a difference-in-differences framework, where we compare the relative change in 10th-grade pass rates in the Texas Assessment of Academic Skills (TAAS) of high- and low-performing schools before and after the implementation of the Top 10% Plan. Controlling for time-varying educational inputs (i.e., student demographics, teacher characteristics, school spending) and school district fixed effects, we find that under the Top 10% policy low-performing high schools – 1st, 2nd, 3rd, and 4th quintiles in the school achievement distribution – experience a larger increase in the 10th-grade TAAS pass rate relative to schools in the top quintile. More specifically, the TAAS pass rate of the bottom quintile (1st quintile) high schools increased by 8 percentage points relative to the top quintile schools, a 29 percent narrowing of the gap in the pre-policy years. The TAAS pass rate of schools in the 2nd, 3rd, and 4th quintiles also increased more than that of the top quintile schools, though these changes were smaller than that of the bottom quintile. In addition, these results hold regardless of the racial composition of the high school; that is, predominantly Hispanic and black majority schools also experienced gains in the TAAS pass rate during the Top 10% policy.

² Research shows that labor market return to college education varies substantially with types of colleges attended, for example, Brewer and Ehrenberg (1996); Brewer, Eide, and Ehrenberg (1999); Black and Smith (2004); Zhang (2009); and Hoekstra (2009).

In sharp contrast to this relative increase in the TAAS pass rate after the enactment of the Top 10% Plan, we find generally similar trends in pass rates for all schools in the pre-policy years. The lack of pre-existing differential trends provides support for assigning a causal interpretation to the benefits associated with the Top 10% Plan. We further conduct a falsification test using the TAAS pass rates for lower grade spans (i.e., grades 7th and 8th) as outcome measures; these results show no significant differences in the growth trend among different types of schools in post-Top 10% years, suggesting that the findings for high school performance are unlikely to be the result of the increasing stringency of the Texas school accountability policies over this period.

Our results are consistent with the theoretical prediction of a rank-order tournament framework à la Lazear and Rosen (1981).³ College admissions process is inherently a rank-order tournament among high school students: Students with better academic credentials and extracurricular activities win and attend their desired college, with the share of winners determined by the supply of college seats. Tournament theory predicts that *ceteris paribus* agents raise their effort level when the gains from winning the tournament relative to losing increase. Therefore, the higher return to efforts induced by the change to the Top 10% Plan is likely to encourage students from low-performing high schools to work harder and attain better academic achievement. Because the Top 10% policy brings about the largest increases in returns to efforts for students from the lowest-ranked high schools, we expect these students to exhibit the largest improvements in achievement. Given the heterogeneity of the student body and the possibility that not all students in these high schools may participate in the tournament competition, our point estimates are likely to underestimate the effect of the Top 10% policy on college-bound students in disadvantaged high schools.

³ In the original work of Lazear and Rosen (1981), the central theme of the theoretical development has focused on examining different aspects of the *incentive effects* on employees of tournament as a promotion scheme in the labor market (Green and Stokey 1983, Nalebuff and Stiglitz 1984, O'keeffe, Viscusi, and Zeckhauser 1984). The change in college admissions policy in Texas introduced an exogenous change in incentives faced by different types of students.

While we find that students in low-performing schools exert relatively more effort on course work following the enactment of the Top 10% policy, there is also some evidence that they are less likely to enroll in advanced courses. This may be related to the fact that advanced courses and basic courses count equally in students' grade point average calculation.

Our study is closely related to the literature on the role of incentives in education. Hanushek (2008) reviews recent studies on both supply- and demand-side incentives. The former are programs operating on school personnel, including pay for performance schemes, accountability with rewards and punishments attached to outcomes, and increased decision-making authority in schools; these incentives schemes have generally had positive impacts on student achievement.⁴ Most of the demand-side incentives reviewed by Hanushek (2008) involve monetary rewards to students for improved school attendance. Recent papers by Bettinger (2008), Kremer, Miguel, and Thornton (2009), Angrist and Lavy (2009), and Jackson (2010) use small-scale, randomized trials to show that student academic achievement improves when faced with monetary rewards. Although the Top 10% Plan was not proposed as an incentive program for high school students, it essentially provides high rewards – the prospect of attending a state flagship university – to high-achieving students in low-performing high schools. Our estimates show that high school students respond to incentives in the form of the longer-term rewards. Given that the Top 10% policy applies to all public high school students in Texas, it has great potential as a successful incentive program in other states.

⁴ Lavy (2002, 2009) study two teacher incentive programs in Israel, where teachers receive monetary rewards for their students' academic performance. Both fit closely to the framework of a rank-order tournament in that prizes are paid to winners of a contest based on the rank order of the winners.

2. Empirical Strategy and Data

2.1 Empirical Strategy

A difference-in-differences approach is used to analyze the incentive effects of the Texas Top 10% Plan on high school students' academic achievement. The tournament theory of college admissions would predict that the Top 10% Plan raises the effort level of students in low-performing high schools substantially more than that of students in high-performing high schools. Thus, we test this prediction in a difference-in-differences framework, using high school academic achievement as a measure of effort level. Intuitively, we first compare the academic achievement of high- and low-performing high schools before and after the Top 10% Plan separately; the difference between these two differences measures the impact of Top 10% Plan on low-performing schools relative to high-performing schools. The basic regression equation is as follows:

$$Y_{jt} = \alpha + \sum_{k=1994}^{2001} \beta_k \cdot I(\text{Year}_t = k) + \sum_{m=1}^4 \gamma_m \cdot I(QI_j = m) + \sum_{m=1}^4 \delta_m \cdot \text{Post}_t \cdot I(QI_j = m) + \theta \cdot X_{jt} + \varepsilon_{jt} \quad (1)$$

The dependent variable Y_{jt} is an academic achievement measure for high school j in year t ; we use primarily the pass rate in the Texas Assessment of Academic Skills (TAAS) tests of 10th graders in subject areas reading, math, and writing from the 1994-95 to 2001-02 school years. The TAAS tests are designed to evaluate student mastery of grade-specific subject matter that is prescribed by the state curriculum. Hence performance on these tests is likely to be closely related to course performance and G.P.A. The 10th-grade TAAS is an exit-level test; students are required to pass it in order to qualify for graduation from high school.⁵

We use data from 1994-95 to 2001-02 because of two major changes that occurred beginning with the 2002-03 school year. First, the passage of the federal No Child Left Behind Act

⁵ Students may choose not to take the exit-level TAAS if they have already met their testing requirements for graduation by passing End-of-Course examinations (EOC). Students who have passed the EOC are credited as passers in calculating the school and district's TAAS passing rates for accountability purpose.

(NCLB) on January 8th, 2002 and its implementation by states in 2003 demanded stronger accountability of public schools in every state. Second, in 2002-03, TAAS was replaced by the Texas Assessment of Knowledge and Skills (TAKS), which is deemed to be a more challenging exam than the TAAS. Both of these changes may cause differential impacts on low- and high-performing high schools; therefore, we do not include recent years in our analysis.

We rank order high schools into quintiles based on the average of a school's median ACT scores prior to the Top 10% Plan (1993-94 to 1995-96 school years). We create an indicator for the quality of high school j , QI_j , by designating the 5th quintile of schools as top schools (omitted category) and the 1st quintile as bottom schools. $Post_t$ is a binary variable taking the value equal to 1 for the post-Top 10% period (1997-98 to 2001-02 school years) and equal to 0 for years prior to the Top 10% policy (1994-95 to 1996-97 school years). X_{jt} is a vector of time-varying high school characteristics including student demographics and school inputs. Lastly, ε_{jt} is a stochastic error term.

The coefficients of interest are the δ_m 's. These difference-in-differences estimates capture the differences in the academic achievement growth between lower-performing schools and schools in the top quintile of the performance distribution in the period following the introduction of the Top 10% Plan. The assumption underlying the empirical strategy is that high schools at different points of the achievement distribution experience otherwise similar changes in educational environment during the period surrounding the Top 10% policy, so that the observed trend in achievement of top schools (5th quintile) provides an appropriate counterfactual estimate of what would have happened to low-performing schools in the absence of the Top 10% Plan. Note that the vector β_k , coefficients on the year indicators, reflects both the common time trend for all schools were there no Top 10% policy and the changes in achievement of highest-performing schools due to

the Top 10% Plan; therefore, we cannot separately estimate the level effect of the Top 10% Plan for each school quintile.

To ensure that we isolate the relative impact of the Top 10% Plan, we control for factors that could independently influence a school's achievement. These include student composition variables – percentages of minority, economically disadvantaged, low English proficiency, and gifted students, and other school input variables (i.e., expenditure per student, teacher-student ratio, and average teacher experience). Additionally, we also control for school district fixed effects, which captures constant, district-specific factors that may affect school achievement such as education policies, demographics, and local labor market conditions.

We also conduct several sensitivity analyses to address the confounding factors that may potentially invalidate the interpretation of our difference-in-differences estimates. First, the lower- and top-performing high schools may follow different growth paths prior to the policy implementation. Second, another important concurrent educational policy, the Texas school accountability requirement, may become more stringent during the same time period and may have a stronger impact on the low-performing schools. Third, in response to the Top 10% policy, some students may choose to enroll in low-performing high schools in order to more easily attain the top decile of academic performance. When this selection is not fully captured by the student demographic controls, school achievement may improve, but it may not be attributed to the positive effect on student effort brought about by the Top 10% Plan. We conduct three separate analyses that tackle these confounding factors, and provide evidence that none of these issues are driving the main results.

2.2 Data

Data for the analysis are obtained from the Academic Excellence Indicator System (AEIS) of the Student Assessment Division of the Texas Education Agency (TEA). We construct a panel of Texas high schools for the 1994-95 to 2001-02 school years. The sample includes all regular schools with a high school section. Alternative or magnet schools as well as juvenile delinquency centers are dropped from the analytic sample. The data set includes 1,145 high schools.

The AEIS data contain information on student composition, teacher characteristics, school spending, student activities, and outcomes. We use the median ACT score of a school's graduating class averaged over 1993-94 to 1995-96 school years to sort schools into pre-policy performance quintiles, with the 1st quintile consisting of the bottom, lowest-performing schools.⁶ Maps 1 and 2 illustrate the geographic distribution of schools by performance quintile and by racial composition. There is striking overlap between schools in the two lowest performance quintiles and schools with a high concentration of minority, in particular Hispanic students. In addition, schools with a high concentration of Hispanic students and those with a high concentration of black students rarely overlap; the former exists along the southwest border and the latter on the east.

Panel A of Table 1 reports the descriptive statistics of the dependent variable, the school overall pass rate in 10th-grade TAAS tests (reading, math, and writing). The first row reports the mean and standard deviation of the pass rate. Over the entire period of 1994-95 to 2001-02 academic years, on average 70 percent of 10th graders passed the TAAS tests; however, substantial differences exist between the top and lower quintiles, particularly, the bottom two quintiles. There is a 20 percentage point gap between the top and bottom quintiles, and almost 10 percentage points between the top and 2nd quintiles.

⁶ We also use the pre-Top10 Scholastic Aptitude Test (SAT) scores to sort schools into performance quintiles, and the regression results are virtually the same.

The TAAS pass rate gaps between schools in the top and lower quintiles, however, are not constant over time. Figure 1 illustrates the differential trends in TAAS pass rates of school in different performance quintiles. Each line plots the change in the pass rate for that performance quintile relative to its value in the 1997-98 school year. Between the 1994-95 and 1997-98 school years, trends in pass rates for the top and each of the 2nd, 3rd, and 4th quintiles track each other very closely; thus the relative gap between these quintiles is virtually unchanged. The gap between the top and the bottom quintile also remains constant except during the school year 1995-96, when the pass rate in the bottom quintile schools drops instead of increases as it does in all other schools. In contrast, between 1998-99 and 2001-02 school years, there is an unmistakable divergence in the pass rate trend between the top and the other quintiles. As a result, the TAAS pass rate gap narrows, with statistically significant narrowing for the two bottom quintiles (1st and 2nd). The narrowing starts in the 1998-99 school year and continues in the following years. The pass rate for each year-by-quintile is reported in Appendix Table A1. The rest of Panel A of Table 1 reports the results of a simple difference-in-differences analysis with no control variables. Relative to the top quintile, all other quintiles experience a significantly larger increase in the 10th-grade TAAS pass rate in the post-Top 10% years compared to the pre-Top 10% years. The regression analysis in the next section shows that the trend observed in the raw data is robust to the addition of control variables and other confounding factors, and hence can be causally linked to the Top 10% Plan.

Panel B of Table 1 reports the summary statistics of the control variables. Low-performing schools have a disproportionately high concentration of minority students, economically disadvantaged students (eligible for federal subsidized school lunches), and students of limited English proficiency. The other school inputs appear to be equally distributed among schools: all schools have about 9 percent of students in gifted-student education program; per student spending

is around \$4,700 in constant 1994 dollars; on average teachers have 13 years of experience, and the pupil-teacher ratio is in a narrow range between 11.5 and 14.

3. Estimation Results

This section first discusses the estimation results for the 10th-grade TAAS pass rate from the basic difference-in-differences model; we report both the average effects over the entire post-reform years and the dynamics of the effects. We then conduct several robustness tests to confirm that the findings from the basic regression are indeed a result of the incentives brought about by the Top 10% policy. Finally, we estimate the 10th-grade TASS pass rate for different racial groups and consider a different outcome measure – the advanced course taking rate.

3.1 Main Difference-in-Differences Analysis

Columns (1) to (3) of Panel A in Table 2, report the estimation results of equation (1) for the overall 10th-grade TAAS pass rate, i.e., the pass rate for the sum of reading, math, and writing tests. Column (1) controls only for year fixed effects; Column (2) adds time-varying control variables for high school characteristics including student demographics and school inputs; finally, our preferred specification in Column (3) further adds school-district fixed effects. Estimates on the year fixed effects are suppressed; robust standard errors clustered at school level are reported. All estimates are robust to the addition of control variables; therefore we focus on estimates in Column (3). The estimates on the quintile indicators measure the average gap between each quintile and the top quintile for the pre-Top10 years (1994-95 to 1996-97). Even after controlling for high school characteristics and school-district fixed effects, there is a significant gap between the top and all other schools. Estimates on the interactive terms between the post-Top10 indicator and school quintile indices are all positive and significant, indicating that relative to schools in the top quintile,

schools in all other quintiles experience on average larger increases in the TAAS pass rate during the post-Top 10% years (1997-98 to 2001-02). Indeed, relative to the top quintile, the bottom quintile experiences an 8 percentage point increase in the TAAS pass rate, and all other quintiles also experience roughly a 3 percentage point increase. As a result, *ceteris paribus*, a 28 percent of the pre-Top10 gap between the top quintile and schools in the lowest two quintiles is closed following the enactment of the Top 10% Plan.

Estimates on several of the control variables are significant and have the expected signs. Schools with larger populations of minority students and students of limited English proficiency have significantly lower TAAS pass rates, and schools with larger shares of students in the gifted-student program have significantly higher TAAS pass rates. Among the three school input variables, only average teacher experience has a significant impact on school outcome. Schools with more experienced teachers show better performance, broadly consistent with estimates in the literature.

Panels B, C, and D of Table 2 report the difference-in-differences estimates for the reading, math, and writing TAAS pass rates separately. The results for subject specific TAAS pass rates are similar to those reported in Column (3) of Panel A. The pass rates in all three subjects show a larger increase for lower-performing quintiles in the post-Top10 years relative to the top quintile, with the largest increase for the TAAS math test.

To investigate how the impact of the Top 10% Plan varies over time, we estimate equation (1) using subsamples spanning different post-Top10 years. These results are reported in Table 3. More specifically, Column (1) uses as the post-Top10 period the 1997-98 school year only, Column (2) 1997-98 and 1998-99 school years, Column (3) 1997-98 to 1999-2000 school years, Column (4) 1997-98 to 2000-01 school years, and the last column is a duplicate of Column (3) of Table 2, which uses all five post-Top10 school years. The estimates on the interactive terms thus capture the average effect of the Top 10% Plan cumulative over increasingly longer post-Top10 periods. One year after the introduction of the Top 10% policy (Column (1)), all other schools have experienced

larger improvements relative to the top quintile, although these improvements are only significant for the bottom quintile, with an additional 2 percentage-point increase. The impact of the Top 10% policy grows over time, with the largest increase between the 1997-98 and 1998-99 school years.

In an alternative approach to the dynamic analysis in Table 3, we include a full set of interactive terms between the post-Top10 indicator and all the year indicators, using the 1997-98 school year as the bench mark. Estimates on these interactive terms reflect the extra improvement in each year relative to 1997-98 for all schools relative to the top quintile. Point estimates from this full dynamic model are depicted in Figure 2. Again, low-performing schools in the 1998-99 school year show the largest improvement relative to the top schools; the upward trend continues in later years but at a lower rate. Importantly, similar trends are not observed prior to school year 1997-98.

The dynamics may reflect the fact that it takes some time for information about the Top 10% Plan to reach high school counselors and students. Another plausible interpretation of this growth trend is that 10th graders in later years are exposed to the Top 10% Plan for a longer time and hence may start to increase their effort level in the 9th grade in order to improve their cumulative high school G.P.A.; this may leads to better performance on the 10th grade tests. For example, 10th graders in 1998-99 school year were first exposed to the Top 10% Plan in grade 9 and could be induced to work harder then. The fact that the growth in later years is flatter suggests that students exposed to the Top 10% Plan at lower grades may not respond by increasing their effort level. This is echoed in the estimation results for 7th and 8th-graders below.

3.2 Robustness Analysis

In this section, we conduct additional analyses that address major concerns that may potentially invalidate the interpretation of our difference-in-differences estimates.

3.2.1 Pre-existing Trend between Schools

In order for us to interpret the results in section 3.1 as unbiased and causal effects of the Top 10% Plan on student achievement, top schools and other schools must experience common trends in the pre-Top10 period. If schools are on different growth paths before the Top 10% policy is enacted, they may continue to do so afterwards even in the absence of the Top 10%'s impact, and our estimates will in part reflect this pre-existing trend. Figures 1 and 2 suggest that the common trend assumption holds for the high schools in our sample; in this section we formally test this assumption. More specifically, we estimate equation (1) using only the pre-Top10 data. In this new difference-in-differences analysis, we designate 1995-96 as the “fake Top10” policy year in which it was enacted; thus the 1994-95 school year is the “pre-policy” period, and 1995-96 and 1996-97 the “post-policy” period. Table 4A reports the results of this exercise for overall TAAS pass rates and for the pass rate in each subject separately. Columns (1) to (3) of Panel A present the results with and without controls. The coefficients on both the school quintile indicators and the interactive terms are not significantly different from each other or from zero, indicating that in each period before and after the “fake Top10” schools in different quintiles follow the same growth trend in academic achievement.

3.2.2 Confounding Effects of School Accountability Requirement

We are concerned that other state-wide contemporary policy changes may affect schools in different performance quintiles differently. The most important policy change is the Texas school accountability measures, which were introduced in 1993 and aimed at improving the quality of public schools. These school accountability measures likely affect low-performing schools more than high-performing schools. If the school accountability requirements became more stringent around 1997, we may also observe larger performance improvement of low-performing than high-

performing schools. We address this concern by estimating equation (1) using the TAAS pass rates for lower grade spans (i.e., 7th and 8th) as the outcome measures. In doing so, we assume that younger students in different types of schools are much less likely to be differentially affected by the Top 10% policy.⁷ The results for the 7th and 8th grades are reported in Table 4B.⁸ We use the same school quintile categories as before, so the sample in each column includes high schools that also have a lower-grade section. Most of the point estimates shown in Table 4B are insignificant. In particular, for 8th graders, all estimates are negative, and estimates are negative and significant for the 2nd and 3rd quintiles, suggesting that low-performing schools performed worse relative to the top schools in the post-Top10 years. Figure 3 depicts the point estimates of a full dynamic specification for the 8th-grade TAAS pass rate, which shows a clear difference from the pattern in Figure 2. Overall, for lower grades, there is no consistent evidence of larger improvement in academic achievement for low-performing schools following the Top 10% policy; therefore, the estimates in Table 2 are unlikely to be driven by changes in school accountability in Texas.

3.2.3 Confounding Effects of High School Selection

The Top 10% Plan may induce some students to choose to attend low-performing high schools that they would not otherwise choose in order to more easily attain the top decile (Cullen, Long, and Reback 2010; Cortes and Friedson 2010). This strategic behavior is likely to result in improved achievement of low-performing schools. However, this type of strategic behavior has different implications. In particular, if selection effects are the primary underlying cause of the large

⁷ The Top10% policy may have a positive effect on the achievement of younger students if they believe that better preparation may increase their chance of attaining the top decile in high school; however it is not clear whether students in low-performing schools will be affected by the policy more than other students.

⁸ TAAS 7th grade include only math and reading tests and for the TAAS 8th grade, math, reading, and writing are all tested.

improvement in low-performing schools shown in Table 2, we may not conclude that the Top 10% policy has discernible effects on student effort levels.

Although time-varying student demographic controls can mitigate concerns over selection bias, we conduct a more rigorous analysis to further address this confounding factor. The point of departure is that to attend a school that one would normally not have chosen is costly. It involves commuting longer distances to go to school or for parents to go to work if a household moves residence, and it is even more costly if parents have to change jobs in order for children to attend a desired school. Therefore, in areas with more local schooling options the “school selection” cost is lower, and we expect more school selection. As a result, the difference-in-differences estimates of equation (1) for these schools may capture more of the school selection effect of the Top 10% policy. The opposite holds for schools that are “monopolies” of the areas they serve.

We implement this test by estimating equation (1) on samples of “monopolistic” schools and “competing” schools separately. The results are reported in Table 4C. Column (1) uses a sample of schools that are the only school in their respective school district (i.e., “monopolistic” schools), and Column (2) uses schools that belong to multiple-school districts (i.e., “competing” schools). The estimates on the interactive terms are larger for competing schools than for monopolistic schools, suggesting that there is some degree of school selection following the Top 10% Plan. However and more importantly, the estimates for the monopolistic schools are all positive, statistically significant, and close in magnitude to the estimates in Column (3) of Table 2. This suggests that the estimates in Table 2 reflect by and large the positive effort effect rather than the school selection effect. Columns (3) to (6) of Panel B, consider “monopolistic” and “competing” schools within a county, as some of the single-school districts are small, making it easy to move to a school in an adjacent district. More specifically, Columns (3) to (6) use samples of schools located in counties with a Herfindahl-Hirschman Index (HHI) of schools’ market share less than 0.25 (*least* monopolistic schools),

between 0.25 and 0.50, between 0.50 and 0.75, and greater than 0.75 (*most* monopolistic schools) respectively.⁹ Even among the most monopolistic counties (Columns (5) and (6)), the point estimates for the bottom quintile schools reveal an effort effect of the Top 10% policy.¹⁰

In sum, the estimation results from Tables 4A, 4B and 4C, confirm the main findings in Table 2. Thus, the positive effect of the Top 10% Plan on academic achievement comes primarily from its positive impact on students' effort.

3.3 Estimation by Race

As shown in Maps 1 and 2, Texas schools with a high concentration of white students and schools with a high concentration of minority (black and Hispanic) students are located in quite different geographic areas, and black and Hispanic schools are disproportionately more likely to belong to the low-performing school quintiles. This raises the question of whether our main findings for schools overall are driven by particular racial groups, or whether all students respond similarly to the incentives brought about by the Top 10% policy, regardless of race. We estimate the response of different racial groups with two complementary approaches, and the results are reported in Table 5.

In the first approach, we examine the time trend of *within-school* racial differences in academic achievement. We calculate for each school the differences in 10th-grade TAAS pass rates between whites and blacks, between whites and Hispanics, and between blacks and Hispanics; this leads to losses of a large number of observations due to the fact that not all schools have sufficiently large student population of both races to report the TAAS pass rates for these races. For each of these

⁹ The Herfindahl-Hirschman Index (HHI) of schools' market share in each county is calculated as $HHI = \sum_j s_j^2$,

where s_j is school j 's share of students in the county. An HHI close to 1 indicates a county with a more "monopolistic" school system, and an HHI close to 0 indicates a county with a more "competing" school system.

¹⁰ All regressions include the full set of controls and fixed effects. We also estimate equation (1) using a sample of schools located in counties with only one school. The estimates on the interactive terms are positive but significant only for the bottom quintile. The sample size is small, however, with only 48 schools.

racial differences, we essentially have a sample of schools that are sufficiently integrated in the two races in question.¹¹ The estimates on the interactive terms are reported in Columns (1) to (3) of Table 5. All estimates are statistically insignificantly different from zero, suggesting that racial groups within schools respond similarly to the Top 10% Plan.

In the second approach reported in Panel B of Table 5, we consider predominantly white, black, or Hispanic schools separately. We define a school as white if at least 50% of its students are white during 1994-95-1996-97 school years; similarly, black schools have at least 10% black students, and Hispanic schools at least 30% Hispanic students during the same period.¹² On average, white schools have 78 percent white students, black schools 28 percent black students, and Hispanic schools 61 percent Hispanic students. We group white, black, and Hispanic schools into quintiles based on the average of a school's median ACT scores prior to the Top 10% policy, and estimate equation (1) for the three samples separately. Because each sample has one dominant racial group, estimates on each sample will reflect primarily the response to the Top 10% policy by a particular race; this is especially true for the white and Hispanic samples. Columns (4) through (6) of Table 5 report the estimation results. The estimates appear to be different across racial groups, but taken together they are consistent with estimates in Table 2, and the differences reflect precisely the performance distribution of each type of school relative to the distribution of all schools. As shown in Appendix Table A2, all but a few white schools belong to the top four performance quintiles in the overall distribution; black schools are more evenly distributed in the overall distribution, but the majority of the top black schools are in the 2nd quintile of the overall distribution; most of the Hispanic schools belong to the lowest three quintiles in the overall distribution, and the lowest two quintiles consist of schools at the lower end of the bottom quintile in the overall distribution. As an

¹¹ For each pair of races, these “integrated” schools are quite evenly distributed over the school performance quintiles.

¹² These percentages correspond roughly to the sample means of schools' racial composition. We also use 20 percent and 40 percent as cutoffs for black and Hispanic school respectively; the results are broadly similar, but we lose many more observations.

example, the estimates in Column (4) for white schools correspond to the estimates on the interactive terms for the 2nd, 3rd, and 4th quintiles in Table 2 (Column (3)). Similar correspondence can be established between Columns (5) and (6) and estimates reported in Table 2.¹³ To summarize, estimates in Columns (4) to (6) are consistent with those in Table 2, and different racial groups respond to the Top 10% policy in the same manner as predicted by their positions on the performance distribution. Additionally, the estimate on the bottom quintile in Table 2 captures by and large the reaction to the Top 10% Plan by black and Hispanic schools.

In sum, the two approaches in this section jointly establish that the positive response to the Top 10% is universal across racial groups.

3.4 Advanced-Course Taking Behavior

With the enactment of the Top 10% policy, a high school senior is qualified for college admission if his cumulative G.P.A. is in the top decile of his class, regardless of the courses taken. For students aiming for the top decile, it is less costly to take more of the basic courses and forego the more difficult advanced courses. Because materials tested in TAAS are the most basic requirements of the curriculum, improvement in TAAS is more closely related to an improvement in the performance in the basic courses. The question remains, do students reallocate their effort toward basic courses at the expense of more advanced courses? We answer this question by considering another measure of student activity: percentage of students in a school that take advanced courses. The estimation results are reported in Table 6. Column (1) of Panel A, shows that before the Top 10% fewer students in low-performing schools took advanced courses than students in the top schools; after the Top 10%, this deficit becomes larger and significantly so for the 2nd and 4th quintile schools. Columns (2) through (4) show that white, black, and Hispanic students behave quite similarly.

¹³ For black and Hispanic schools, the estimates in general correspond to the differences between estimates on the 3rd, 4th, and 5th quintiles and the estimate the 2nd quintile in Table 2, but the correspondence is not precise.

To summarize, we have shown that the introduction of the Top 10% Plan induced larger increase in effort level by students in low-performing high schools; as a result, these schools experienced greater improvement in academic achievement as measured by the TAAS pass rate. Nevertheless, there is some suggestive evidence that students reallocated their effort away from advanced courses under the Top 10% policy.

4. Conclusion

The findings in this paper suggest that students respond to individual accountability and incentives: as long as the reward is sufficiently large, students respond by exerting more effort, thereby improving academic achievement. Our findings have important policy implications. While school accountability systems are vulnerable to a variety of strategic behavior, individual accountability establishes a standard less prone to manipulation. To the extent that better peers have a positive impact on student performance, even strategic high school choices may be beneficial. Of course, not all students are likely to be equally responsive. Future research will examine the impact of the Top 10% policy at different points of performance distribution within a high school; in particular, how the Top 10% Plan affected the lowest-performing students.

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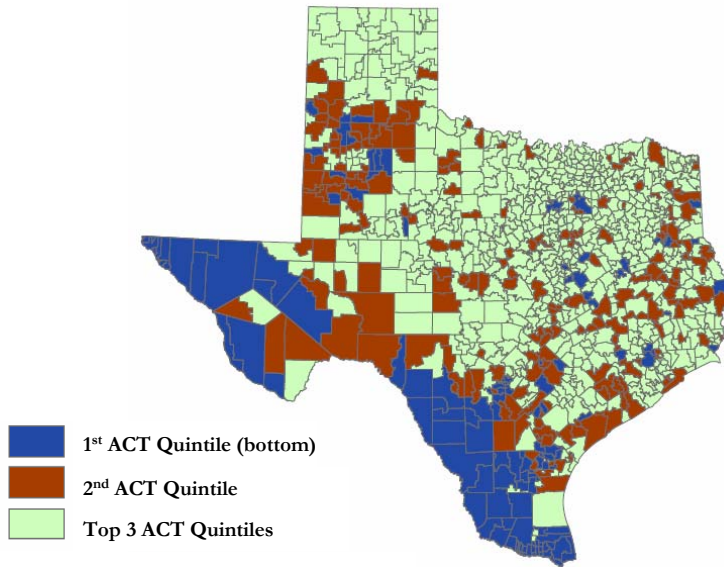
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Map 1: Quintiles of School District Quality



Map 2: Texas School Districts by Percentage Hispanic and Black

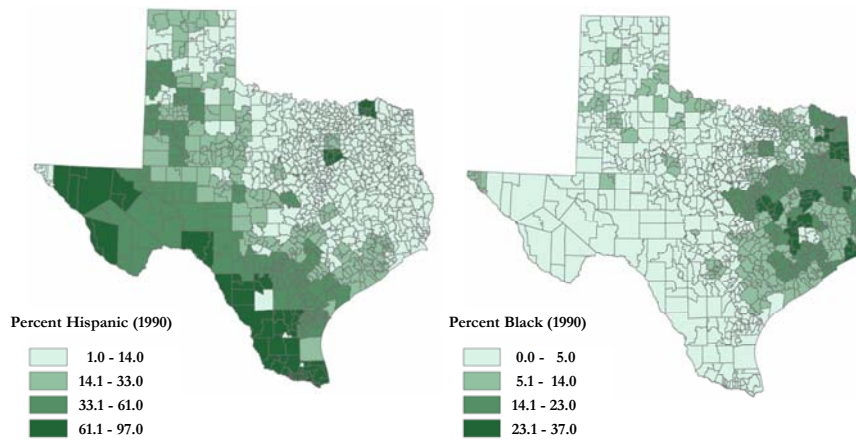


Figure 1: 10th Grade TAAS (RM&W) Pass Rate by ACT Quintiles

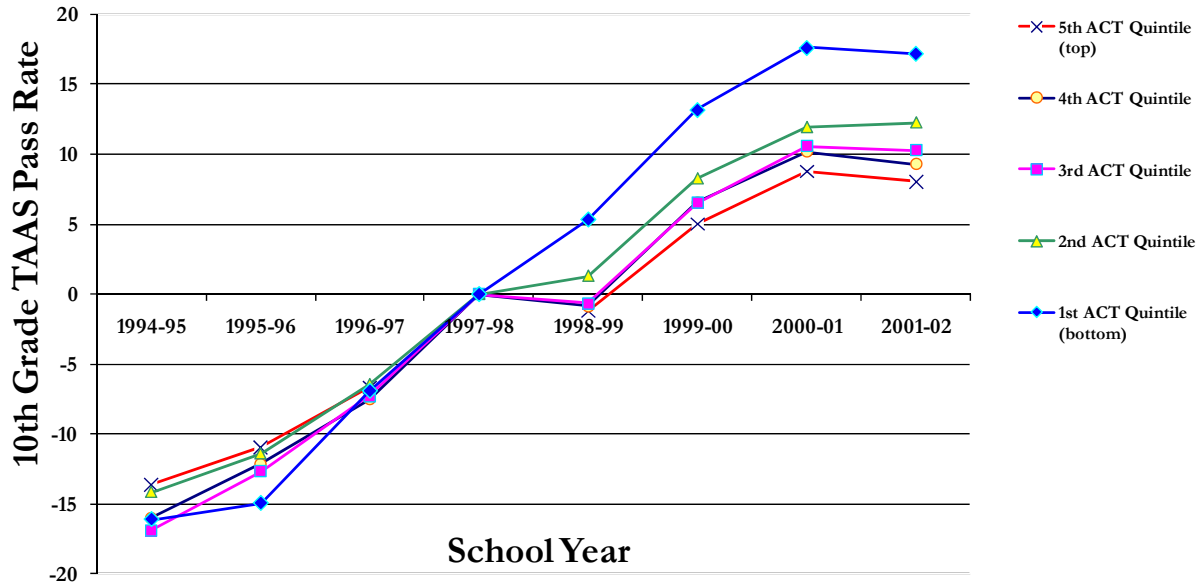


Figure 2: Difference-in-Differences Results -
10th Grade TAAS (RM&W) Pass Rate

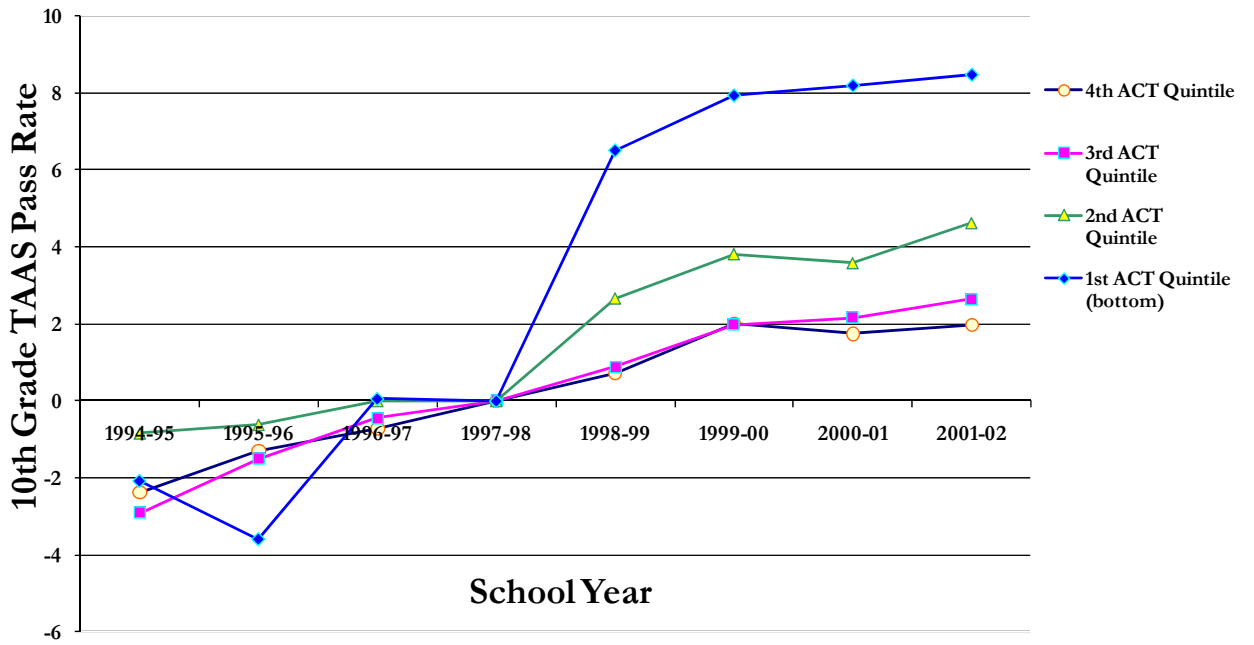


Figure 3: Falsification Difference-in-Differences Results -
8th Grade TAAS (RM&W) Pass Rate

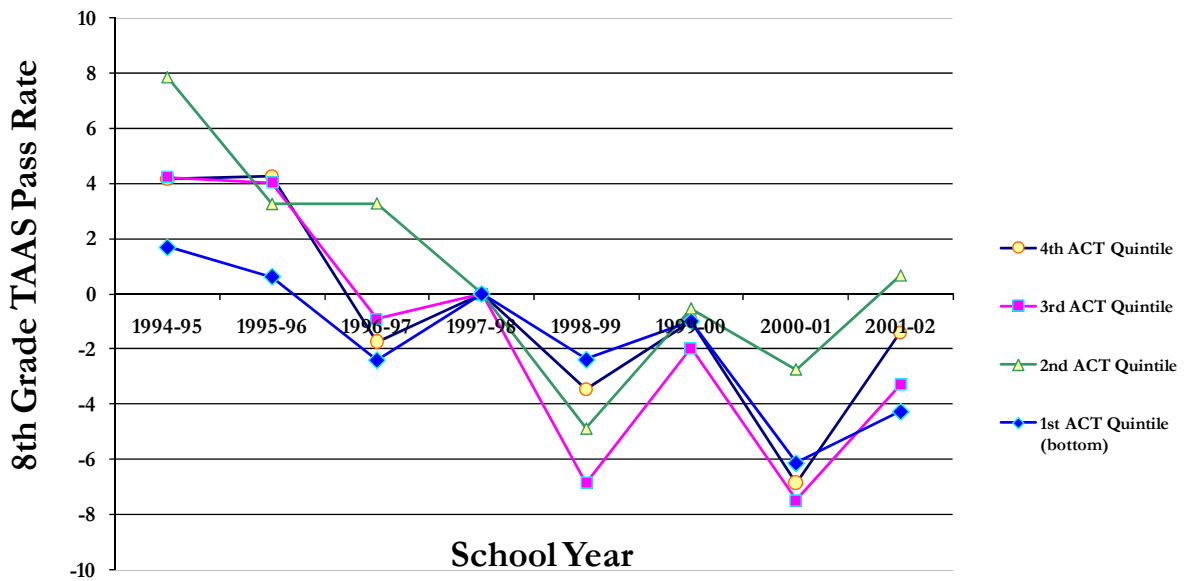


Table 1: Descriptive Statistics - Means and Standard Deviations

	Total	School Quality Quintiles Based on ACT Scores				
		1st (Bottom)	2nd	3rd	4th	5th (Top)
Panel A: Dependent Variable						
10th Grade Texas Assessment of Academic Skills (TAAS) in Reading, Math, & Writing (RM&W) Pass Rate	70.45 (17.12)	56.31 (18.33)	69.00 (16.23)	74.39 (15.59)	74.10 (14.12)	78.59 (11.33)
Before Top 10% Plan: 1994/95 - 1996/97	59.19	41.77	58.14	63.32	63.52	69.51
Top 10% Plan : 1997/98 - 2001/02	77.18	65.08	75.53	80.89	80.43	84.04
Difference: After - Before [s.e.]	17.99 *** [0.28]	23.31 *** [0.64]	17.39 *** [0.65]	17.57 *** [0.68]	16.91 *** [0.57]	14.54 *** [0.42]
Difference-in-Differences: Diff(Q**) - Diff(Q1) [s.e.]		8.78 *** [0.77]	2.85 *** [0.77]	3.04 *** [0.80]	2.37 *** [0.71]	
Panel B: High School Characteristics						
% Minority Students (non-white, non-Asian)	39.19 (29.19)	85.46 (14.89)	48.91 (16.20)	26.35 (14.50)	21.79 (12.20)	12.97 (7.69)
% Black Students	10.39 (16.29)	17.40 (28.27)	13.94 (15.45)	9.42 (10.09)	7.14 (7.58)	3.81 (4.03)
% Hispanic Students	28.52 (28.21)	67.95 (30.76)	34.72 (19.90)	16.55 (13.55)	14.32 (10.72)	8.80 (5.82)
% Economically Disadvantaged Students	37.29 (20.95)	65.17 (16.91)	43.55 (13.96)	35.62 (11.63)	27.06 (9.68)	14.43 (8.14)
% Limited English Proficient Students	4.65 (8.08)	14.02 (13.24)	4.32 (4.88)	1.99 (2.63)	1.80 (2.23)	1.15 (1.40)
% Gifted Students	9.64 (7.15)	9.29 (7.15)	9.63 (7.42)	9.69 (7.06)	9.93 (7.77)	9.63 (6.15)
Expenditure per Pupil (in 1994 \$1,000)	4.74 (1.30)	4.61 (1.16)	4.91 (1.45)	5.12 (1.50)	4.69 (1.21)	4.36 (1.00)
Teacher Student Ratio	12.91 (3.01)	13.95 (3.14)	12.52 (3.26)	11.52 (2.66)	12.75 (2.74)	13.86 (2.50)
Average Teacher Experience	12.64 (2.41)	12.61 (2.59)	12.65 (2.50)	12.62 (2.40)	12.61 (2.58)	12.71 (1.88)
Observations (school-by-year)	9,124	1,811	1,845	1,791	1,942	1,735

Notes: Numbers in parentheses and bracket are standard deviations and standard errors, respectively. The expenditure per pupil variable is reported in real terms of 1994 dollars. 1st quintile is defined as the bottom fifth (0-20%), 2nd quintile is defined as the lower middle (20-40%), 3rd quintile is defined as the middle (40-60%), 4th quintile is defined as the upper middle (60-80%), and 5th quintile is defined as the top fifth (80-100%). All school quality quintiles are based on pre-policy ACT scores.

*** indicates statistical significance at the 1% level.

Source: Academic Excellence Indicator System (AEIS), Texas Education Agency (TEA), 1994-95 to 2001-02.

Table 2: Difference-in-Differences Regressions - 10th Grade Texas Assessment of Academic Skills (TAAS) Pass Rate

	Panel A:			Panel B:		Panel C:		Panel D:	
	TAAS Reading, Math, and Writing (RM&W)			TAAS Reading		TAAS Math		TAAS Writing	
	(1)	(2)	(3)	(1)	(3)	(1)	(3)	(1)	(3)
Post x 4th ACT Quintile	2.381 *** (0.708)	2.474 *** (0.716)	2.754 *** (0.746)	1.081 ** (0.422)	1.312 *** (0.423)	2.670 *** (0.708)	2.966 *** (0.706)	0.853 ** (0.410)	1.056 ** (0.410)
Post x 3rd ACT Quintile	3.066 *** (0.797)	2.982 *** (0.808)	3.144 *** (0.839)	1.973 *** (0.494)	2.020 *** (0.494)	3.329 *** (0.799)	3.408 *** (0.795)	2.033 *** (0.456)	2.091 *** (0.458)
Post x 2nd ACT Quintile	2.883 *** (0.769)	3.306 *** (0.765)	3.431 *** (0.788)	3.139 *** (0.536)	3.535 *** (0.528)	3.628 *** (0.745)	4.077 *** (0.738)	1.943 *** (0.485)	2.252 *** (0.478)
Post x 1st ACT Quintile	8.793 *** (0.769)	9.024 *** (0.785)	8.046 *** (0.809)	9.562 *** (0.551)	8.895 *** (0.553)	10.771 *** (0.773)	10.085 *** (0.776)	5.030 *** (0.553)	4.455 *** (0.557)
4th ACT Quintile (60-80%)	-5.982 *** (0.830)	-4.314 *** (0.861)	-3.618 *** (1.255)	-3.169 *** (0.471)	-1.475 ** (0.678)	-5.417 *** (0.807)	-3.972 *** (1.081)	-2.517 *** (0.446)	-0.972 (0.779)
3rd ACT Quintile (40-60%)	-6.222 *** (0.963)	-3.820 *** (1.029)	-3.296 (2.048)	-4.048 *** (0.553)	-1.253 (1.293)	-5.735 *** (0.951)	-4.095 ** (1.790)	-3.072 *** (0.510)	-2.344 * (1.224)
2nd ACT Quintile (20-40%)	-11.383 *** (0.929)	-4.475 *** (1.181)	-4.970 *** (1.842)	-8.453 *** (0.620)	-4.029 *** (1.023)	-9.975 *** (0.913)	-5.783 *** (1.578)	-5.931 *** (0.550)	-3.918 *** (1.121)
1st ACT Quintile (0-20%)	-27.746 *** (0.926)	-12.087 *** (1.748)	-9.949 *** (2.581)	-21.818 *** (0.733)	-10.157 *** (1.604)	-25.154 *** (0.912)	-11.903 *** (2.296)	-14.980 *** (0.688)	-7.554 *** (1.695)
Constant	77.658 *** (0.438)	82.865 *** (2.547)	79.622 *** (3.123)	91.949 *** (0.235)	92.843 *** (2.052)	80.689 *** (0.384)	82.919 *** (2.869)	93.917 *** (0.244)	96.458 *** (1.925)
<i>Controls:</i>									
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
High School Characteristics	No	Yes	Yes	No	Yes	No	Yes	No	Yes
School District Fixed Effects	No	No	Yes	No	Yes	No	Yes	No	Yes
Obs (school-by-year)	9,124	9,124	9,124	9,120	9,120	9,116	9,116	9,117	9,117
R ²	0.54	0.57	0.74	0.48	0.68	0.56	0.74	0.29	0.58

Notes: Numbers in parentheses are robust standard errors clustered by high school campus ID. 1st quintile is defined as the bottom fifth (0-20%), 2nd quintile is defined as the lower middle (20-40%), 3rd quintile is defined as the middle (40-60%), 4th quintile is defined as the upper middle (60-80%), and 5th quintile (omitted category) is defined as the top fifth (80-100%).

***, **, * indicates statistical significance at the 1%, 5%, and 10% level, respectively.

**Table 3: Difference-in-Differences Regressions with Varying Post Policy Year Windows -
10th Grade Texas Assessment of Academic Skills (TAAS) in Reading, Math, & Writing (RM&W) Pass Rate**

	(1) 1-Year Window: Up to 1997-98 (3 Yrs Pre, 1 Yrs Post)	(2) 2-Year Window: Up to 1998-99 (3 Yrs Pre, 2 Yrs Post)	(3) 3-Year Window: Up to 1999-00 (3 Yrs Pre, 3 Yrs Post)	(4) 4-Year Window: Up to 2000-01 (3 Yrs Pre, 4 Yrs Post)	(5) All Years: 1994-95 to 2001-02 (3 Yrs Pre, 5 Yrs Post)
Post x 4th ACT Quintile	1.495* (0.897)	1.857** (0.818)	2.421*** (0.762)	2.621*** (0.746)	2.754*** (0.746)
Post x 3rd ACT Quintile	1.430 (0.988)	2.002** (0.888)	2.609*** (0.861)	2.919*** (0.855)	3.144*** (0.839)
Post x 2nd ACT Quintile	0.688 (1.112)	2.000** (0.946)	2.747*** (0.875)	3.084*** (0.822)	3.431*** (0.788)
Post x 1st ACT Quintile	2.288** (0.961)	5.42*** (0.854)	6.811*** (0.816)	7.553*** (0.803)	8.046*** (0.809)
Constant	84.417*** (4.531)	82.939*** (4.135)	82.169*** (3.660)	81.994*** (3.411)	79.622*** (3.123)
<i>Controls:</i>					
Quintile Dummies	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
High School Characteristics	Yes	Yes	Yes	Yes	Yes
School District Fixed Effects	Yes	Yes	Yes	Yes	Yes
Obs (school-by-year)	4,559	5,704	6,844	7,984	9,124
R ²	0.75	0.72	0.73	0.74	0.74

Notes: Numbers in parentheses are robust standard errors clustered by high school campus ID. 1st quintile is defined as the bottom fifth (0-20%), 2nd quintile is defined as the lower middle (20-40%), 3rd quintile is defined as the middle (40-60%), 4th quintile is defined as the upper middle (60-80%), and 5th quintile (omitted category) is defined as the top fifth (80-100%).

***, **, * indicates statistical significance at the 1%, 5%, and 10% level, respectively.

**Table 4A: Pre-policy Difference-in-Differences Regressions -
10th Grade Texas Assessment of Academic Skills (TAAS) Pass Rate**

	TAAS Reading, Math, and Writing (RM&W)		
	(1)	(2)	(3)
Post x 4th ACT Quintile	1.301 (0.982)	1.295 (0.982)	1.250 (1.145)
Post x 3rd ACT Quintile	2.100 * (1.094)	1.976 * (1.105)	1.861 (1.286)
Post x 2nd ACT Quintile	0.404 (1.192)	0.744 (1.197)	0.315 (1.396)
Post x 1st ACT Quintile	0.352 (0.919)	1.000 (0.936)	0.650 (1.078)
Constant	68.390 *** (0.598)	76.259 *** (3.592)	72.866 *** (4.970)
<i>Controls:</i>			
Quintile Dummies	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
High School Characteristics	No	Yes	Yes
School District Fixed Effects	No	No	Yes
Obs (school-by-year)	3,416	3,416	3,416
R ²	0.37	0.43	0.75

Notes: Numbers in parentheses are robust standard errors clustered by high school campus ID. 1st quintile is defined as the bottom fifth (0-20%), 2nd quintile is defined as the lower middle (20-40%), 3rd quintile is defined as the middle (40-60%), 4th quintile is defined as the upper middle (60-80%), and 5th quintile (omitted category) is defined as the top fifth (80-100%).

***, **, * indicates statistical significance at the 1%, 5%, and 10% level, respectively.

**Table 4B: Falsification Test - Difference-in-Differences Regressions
by Lower Grade Spans and TAAS Pass Rate**

	7th Grade: TAAS RM&W		8th Grade: TAAS RM&W	
	(1)	(2)	(1)	(2)
Post x 4th ACT Quintile	-3.08 (2.24)	-1.94 (2.42)	-3.35 (2.56)	-4.41 (2.76)
Post x 3rd ACT Quintile	-1.88 (2.17)	-2.62 (2.45)	-2.47 (2.40)	-6.05** (2.72)
Post x 2nd ACT Quintile	-0.77 (1.97)	-1.03 (2.21)	-3.30 (2.44)	-5.98** (2.69)
Post x 1st ACT Quintile	6.47** (2.51)	4.18 (2.69)	3.13 (2.96)	-2.35 (3.10)
Constant	85.11*** (1.63)	92.31*** (7.70)	67.64*** (2.52)	62.92*** (8.32)
<i>Controls:</i>				
Quintile Dummies	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
High School Characteristics	No	Yes	No	Yes
School District Fixed Effects	No	Yes	No	Yes
Obs (school-by-year)	2,245	2,245	2,263	2,263
R ²	0.32	0.60	0.20	0.56

Notes: Numbers in brackets are robust standard errors clustered by high school campus ID. 1st quintile is defined as the bottom fifth (0-20%), 2nd quintile is defined as the lower middle (20-40%), 3rd quintile is defined as the middle (40-60%), 4th quintile is defined as the upper middle (60-80%), and 5th quintile (omitted category) is defined as the top fifth (80-100%).

***, **, * indicates statistical significance at the 1%, 5%, and 10% level, respectively.

Table 4C: Difference-in-Differences Regressions - Schooling Market Power

	Panel A:				Panel B:							
	School Districts				County Herfindahl-Hirschman Index (HHI)							
	Single		Multiple		≤ 0.25	> 0.25 & ≤ 0.50		> 0.50 & ≤ 0.75		> 0.75		
(1)		(2)		(3)	(4)		(5)		(6)			
Post x 4th ACT Quintile	2.352	***	2.954	**	2.644	***	3.152	**	1.337	3.182		
	(0.848)		(1.177)		(0.907)		(1.504)		(2.366)	(2.382)		
Post x 3rd ACT Quintile	2.599	***	4.426	***	3.528	***	2.257		5.658	**	0.109	
	(0.900)		(1.632)		(1.184)		(1.480)		(2.351)		(2.668)	
Post x 2nd ACT Quintile	2.867	***	5.150	***	4.355	***	3.351	**	1.922		3.051	
	(0.932)		(1.219)		(0.887)		(1.462)		(2.550)		(3.690)	
Post x 1st ACT Quintile	7.144	***	10.757	***	9.137	***	4.932	**	6.705	**	7.543	*
	(1.136)		(1.050)		(0.872)		(1.965)		(2.664)		(3.828)	
Constant	82.223	***	74.214	***	76.801	***	79.026	***	78.367	***	89.259	***
	(2.959)		(5.549)		(3.653)		(5.354)		(10.835)		(20.257)	
<i>Controls:</i>												
Quintile Dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Year Fixed Effects	Yes		Yes		Yes		Yes		Yes		Yes	
High School Characteristics	Yes		Yes		Yes		Yes		Yes		Yes	
School District Fixed Effects	No		Yes		Yes		Yes		Yes		Yes	
Obs (school-by-year)	6,850		2,274		5,043		2,614		990		477	
R ²	0.49		0.85		0.8		0.67		0.67		0.65	

Notes: Numbers in brackets are robust standard errors clustered by high school campus ID. 1st quintile is defined as the bottom fifth (0-20%), 2nd quintile is defined as the lower middle (20-40%), 3rd quintile is defined as the middle (40-60%), 4th quintile is defined as the upper middle (60-80%), and 5th quintile (omitted category) is defined as the top fifth (80-100%).

***, **, * indicates statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5: Difference-in-Differences Regressions - Within and Between Racial School Differences
10th Grade Texas Assessment of Academic Skills (TAAS) in Reading, Math, & Writing (RM&W) Pass Rate

	Panel A:			Panel B:		
	Within School Differences			Between School Differences		
	White-Black (1)	White-Hispanic (2)	Black-Hispanic (3)	White (4)	Black (5)	Hispanic (6)
Post x 4th ACT Quintile	0.408 (1.436)	-0.497 (1.353)	-0.372 (2.006)	2.525 (0.864) ***	1.945 (1.252)	0.787 (1.367)
Post x 3rd ACT Quintile	-1.591 (1.675)	-1.156 (1.518)	2.441 (2.175)	3.124 (0.873) ***	1.256 (1.313)	1.653 (1.625)
Post x 2nd ACT Quintile	-0.409 (1.435)	-2.675 (1.193)	-1.101 (1.821)	3.371 (0.954) ***	2.874 (1.221)	5.234 (1.432) **
Post x 1st ACT Quintile	1.839 (1.740)	-1.029 (1.282)	-1.144 (1.738)	3.343 (1.036) ***	4.576 (1.498)	7.290 (1.459) ***
4th ACT Quintile (60-80%)	2.367 (2.052)	2.623 (1.990)	0.149 (2.203)	-4.370 (1.356) ***	-0.523 (1.995)	-3.184 (2.270)
3rd ACT Quintile (40-60%)	4.607 (2.666) *	2.181 (3.039)	-2.882 (3.876)	-5.566 (1.693) ***	-1.942 (2.197)	-7.178 (2.572) ***
2nd ACT Quintile (20-40%)	3.084 (2.751)	3.662 (2.520)	1.041 (2.843)	-11.982 (2.570) ***	-5.663 (2.364)	-9.826 (2.989) **
1st ACT Quintile (0-20%)	-2.706 (4.424)	-6.901 (3.501)	-1.611 (3.896)	0.769 (3.839)	-7.246 (2.719)	-10.315 (3.372) ***
Constant	21.622 (6.512) ***	17.192 (5.226)	-7.363 (7.595)	79.691 (3.581) ***	74.067 (5.383)	81.594 (6.663) ***
<i>Controls:</i>						
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
High School Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
School District Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs (school-by-year)	3,762	5,628	3,287	6,339	2,901	3,013
R ²	0.40	0.39	0.26	0.66	0.78	0.77

Notes: Numbers in brackets are robust standard errors clustered by high school campus ID. 1st quintile is defined as the bottom fifth (0-20%), 2nd quintile is defined as the lower middle (20-40%), 3rd quintile is defined as the middle (40-60%), 4th quintile is defined as the upper middle (60-80%), and 5th quintile (omitted category) is defined as the top fifth (80-100%).

***, **, * indicates statistical significance at the 1%, 5%, and 10% level, respectively.

**Table 6: Difference-in-Differences Regressions -
Within Racial School Differences in Advanced Course Taking Rate**

	Panel A:		Panel B: Within School Differences		
	All Students		White-Black	White-Hispanic	Black-Hispanic
	(1)		(2)	(3)	(4)
Post x 4th ACT Quintile	-1.688 (0.620)	***	-0.046 (0.770)	-0.557 (0.694)	-0.588 (0.878)
Post x 3rd ACT Quintile	-0.394 (0.664)		-0.010 (0.852)	0.515 (0.741)	0.735 (1.098)
Post x 2nd ACT Quintile	-1.247 (0.683)	*	-0.707 (0.815)	-0.388 (0.685)	1.056 (0.930)
Post x 1st ACT Quintile	-0.212 (0.642)		-1.241 (1.021)	-0.989 (0.744)	0.689 (0.960)
4th ACT Quintile (60-80%)	-3.146 (1.144)	***	0.097 (1.412)	1.918 (1.314)	1.698 (1.040)
3rd ACT Quintile (40-60%)	-4.253 (1.560)	***	0.140 (1.928)	3.075 (1.889)	2.158 (1.449)
2nd ACT Quintile (20-40%)	-4.135 (1.862)	**	3.333 (2.180)	5.942 (2.083)	1.832 (1.390)
1st ACT Quintile (0-20%)	-6.568 (2.708)	**	-2.592 (3.526)	0.327 (3.135)	2.481 (2.081)
Constant	25.592 (2.537)	***	8.542 (3.987)	3.405 (3.273)	-2.139 (3.455)
<i>Controls:</i>					
Year Fixed Effects	Yes		Yes	Yes	Yes
High School Characteristics	Yes		Yes	Yes	Yes
School District Fixed Effects	Yes		Yes	Yes	Yes
Obs (school-by-year)	9,163		5,779	7,988	5,414
R ²	0.50		0.37	0.35	0.26

Notes: Numbers in brackets are robust standard errors clustered by high school campus ID. 1st quintile is defined as the bottom fifth (0-20%), 2nd quintile is defined as the lower middle (20-40%), 3rd quintile is defined as the middle (40-60%), 4th quintile is defined as the upper middle (60-80%), and 5th quintile (omitted category) is defined as the top fifth (80-100%).

***, **, * indicates statistical significance at the 1%, 5%, and 10% level, respectively.

Table A1: TAAS Pass Rate by Year and ACT Quintile

School Year	Total	1st Quintile (Bottom)	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile (Top)
1994-95	55.42	38.32	54.64	58.67	59.45	66.30
1995-96	58.34	39.47	57.39	62.90	63.27	68.97
1996-97	63.78	47.50	62.34	68.27	67.86	73.26
1997-98	70.79	54.42	68.80	75.54	75.40	79.92
1998-99	71.59	59.77	70.09	74.88	74.58	78.70
1999-00	78.73	67.61	77.05	82.07	81.95	84.94
2000-01	82.63	72.05	80.72	86.14	85.58	88.70
2001-02	82.22	71.64	81.06	85.82	84.71	87.96

Source: Academic Excellence Indicator System (AEIS), Texas Education Agency (TEA), 1994-95 to 2001-02.

**Table A2: Joint Distribution of White, Black, Hispanic,
Minority Schools and All Schools**

		White Schools:					
All Schools:		Q5	Q4	Q3	Q2	Q1	Total
	Q5 (Top)	1,264	472	0	0	0	1,736
	Q4	0	640	1,310	0	0	1,950
	Q3	0	0	96	1,320	328	1,744
	Q2	0	0	0	0	908	908
	Q1 (Bottom)	0	0	0	0	56	56
	<i>Total</i>	1,264	1,112	1,406	1,320	1,292	6,394

		Black Schools					
All Schools:		Q5	Q4	Q3	Q2	Q1	Total
	Q5 (Top)	136	0	0	0	0	136
	Q4	440	176	0	0	0	616
	Q3	0	352	384	0	0	736
	Q2	0	0	252	582	0	834
	Q1 (Bottom)	0	0	0	8	582	590
	<i>Total</i>	576	528	636	590	582	2,912

		Hispanic Schools					
All Schools:		Q5	Q4	Q3	Q2	Q1	Total
	Q5 (Top)	8	0	0	0	0	8
	Q4	150	0	0	0	0	150
	Q3	304	0	0	0	0	304
	Q2	144	613	344	0	0	1,101
	Q1 (Bottom)	0	0	272	587	615	1,474
	<i>Total</i>	606	613	616	587	615	3,037

		Minority Schools: Black & Hispanic					
All Schools:		Q5	Q4	Q3	Q2	Q1	Total
	Q5 (Top)	48	0	0	0	0	48
	Q4	328	0	0	0	0	328
	Q3	316	749	336	0	0	1,401
	Q2	0	0	383	722	711	1,816
	Q1 (Bottom)	0	0	0	0	0	0
	<i>Total</i>	692	749	719	722	711	3,593

Source: Academic Excellence Indicator System (AEIS), Texas Education Agency (TEA), 1994-95 to 2001-02.