Revealed Information and High School Course Quality*

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Very preliminary. Comments welcomed.

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I. Introduction

Many low income students lack good information about their academic abilities and their possibilities for attending high-quality colleges. For example, many more low-income students attend selective colleges after statewide policy changes mandated high school juniors to take the ACT exam. Prior to the policy change many low-income students had underestimated the strength of their candidacy for selective colleges (Goodman, 2013). And many high-achieving low-income students lack adequate information about the strength of their candidacy for elite colleges because they are not surrounded by a network of other high-achieving students (Hoxby and Avery, 2013; Roderick, Coca, and Nagoaka, 2011).[1]

The mandated ACT exam pushed some talented students to take the ACT exam who, in the absence of the mandate, would not have taken the exam (Goodman, 2013). The new information revealed to these students (about how competitive they are for selective schools) may push these students to update their effort in their senior year of high school (for example if they learn they qualify for a more selective set of colleges). This paper looks at the extent that students in a low-income district will update effort in high school courses after the mandate to take the ACT exam.

Beginning in the 2000-01 school year, Illinois mandated that high school juniors take the ACT as part of a graduation requirement. The data that we use is the high school transcripts of the universe of students in the Chicago Public Schools (CPS) for the 1993-94 to 2005-06 school years, and covers both pre- and post-mandate years. The data allow us to measure effort along several dimensions, including the rigor of coursework, course attendance, course grades, completion of high school degree, and time to completion of high school degree in both the pre-mandate and post-mandate time period. In addition, the data also allow us to identify schools where there was likely to be small networks of other high achieving students and schools where the mandate has the opportunity to reveal information to a large fraction of students.

In the year after the mandate, students in the schools that had largest increase in fraction taking the ACT saw the largest decline in 12th grade absences. However students in schools with relatively small increases in fraction taking the ACT saw the biggest increase in graduation and advanced courses in 12th grade, and students in schools with the smallest increases in fraction taking the ACT saw the largest increase in taking elective 12th grade math courses.

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[1] Selective schools (Goodman, 2013) are those that typically require an 18 on the ACT (the 35th percentile in the 2003 ACT distribution) and elite colleges (Hoxby and Avery, 2013) are those ranked 1 through 4 ("most competitive" through "very competitive plus") in the Barron's *Profiles of American Colleges.*

Prior to the mandate, taking the ACT was an optional activity outside of school hours and CPS did not keep records of these activities. After the mandate the ACT was taken during school hours and were part of a battery of tests required for graduation. Thus, after the mandate we have a record of each student's ACT score, but not before. However, we do know the fraction of students in each school that took the ACT in the pre-mandate period and we use the difference in the fraction of students taking the exam pre- and post-mandate to identify schools where the mandate will have the most bite.

The remainder of the paper proceeds as follows. Section II describes the data, Section III provides some background on the policy changes in Chicago Public Schools, the 2000-01 ACT mandate, and our identification strategy, Section IV presents our preliminary results, and Section V concludes.

II. Data

The data used in this paper mostly derive from student-level high school transcripts data provided by CPS.[2] The data include detailed information about each course that each active student took during the 1993-94 to 2005-06 school years, including the number of absences, the grade received, a unique teacher ID, the subject matter of the course, a course title, school year, and grade level of the student. We average the course grades over the school year to compute a grade point average (GPA) for each student, and we use the course title to identify "advanced" courses.[3]

The data also allow us to know basic demographic characteristics of each student (e.g. sex and race/ethnicity) and also allow us to know economic conditions of the Census block group that the student lives on (e.g. median income and average educational attainment).

Beginning in the spring semester of the 2000-01 school year, 11th grade CPS students began taking the ACT as part of the Prairie State Achievement Examination (PSAE). Neither exam is officially required for CPS graduation, though almost all students are required to take this battery of exams (Ponisciak, 2005).[4] However, our data are missing the first year of ACT data (2000-01) and begin in the 2001-02 school year.

CPS students also take a battery of tests over the course of their time in school. In 8th grade each student takes the Iowa Test of Basic Skills (ITBS) in math and reading; the ITBS was given

[2] The identities of each student are scrambled and unknown to the researcher.
[3] In particular, courses that are part of the International Baccalaureate (IB), Advanced Placement (AP) are identified as advanced, as well as courses with "accelerated," "honors," "college," or "advanced" in their course title, though upon further inspection some "advanced" math courses are excluded as they are actually regular algebra II classes.
[4] As discussed later, CPS uses the outcomes of these exams to assess the performance of schools as part of the No Child Left Behind (NCLB) requirements.

each year of our time frame. Until 2001-02 CPS students took the TAP in math and reading (usually in 9th and 11th grades). Starting in the 2002-03 school year, 9th grade students in the fall took EPAS exams in English, math, reading, and science; 10th grade students in the fall took the PLAN exams in English, math, reading, and science.

CPS students often come from low income neighborhoods and the majority of students are either African-American of Hispanic (table 1). About 57 percent of CPS students that plan to enroll in a four-year college actually end up attending a four-year college; most that apply are accepted but the fall off occurs because students either do not apply or fail to enroll once accepted (Nagaoka, Roderick, Coca, 2009). College aspirations are common for CPS students, though, as nearly 90 percent aspire to attend college (Roderick et al, 2011). CPS high school course grades are found to be the biggest predictor of college application and enrollment, which implies that effort and other noncognitive skills are important to CPS student college enrollment plan. And examining past CPS graduates' experiences, a student with a 2.0-2.9 GPA and an 18-20 on the ACT will typically get into a somewhat selective school; if that same student had a 3.0-3.4 GPA then they could expect to get into a selective school (Nagoaka et al, 2009).[5]

The outcomes that we focus on in this paper are those that have been identified by CPS as potential ways to signal to colleges that a student is a good candidate to succeed in college. CPS graduates have all met the base level of course requirements for colleges in the state of Illinois by taking 4 years of English, 3 years of math, 3 years of science and 3 years of social science (see Section III for full discussion of CPS graduation requirements). However, most selective schools would like to see 4 years of math and science, and would like to see the student's senior year courses be rigorous (Roderick et al, 2013). Though the first three years of CPS high school is fairly well scripted by taking required courses, senior year leaves a lot of leeway; in recent years CPS has recognized that focusing on enhancing senior year will help college-aspiring students become more attractive to colleges (Roderick et al, 2013; Roderick et al, 2011).

III. Policy Changes and Identification

ACT Mandate

In 2000, Illinois became the first of five states to require all public high school students to take the ACT. There are two primary motivations for these policies. The first relates to the 2001 amendment of the Federal Elementary and Secondary Education ACT (ESEA) of 1995, commonly

[5] The authors name Loyola University (Chicago) and DePaul University as examples of selective schools.

known as No Child Left Behind (NCLB). With NCLB, there has been considerable national pressure on states to adopt statewide accountability measures for their public schools. The Act formally requires states to develop assessments in basic skills to be given to all students in particular grades, if those states are to receive federal funding for schools. Specific provisions mandate several rounds of assessment in math, reading, and science proficiency, one of which must occur in grade 10, 11 or 12. Since the ACT is a nationally-recognized assessment tool, includes all the requisite material (unlike the SAT), and tests proficiency at the high school level, states can elect to outsource their NCLB accountability testing to the ACT, and thereby avoid a large cost of developing their own metric (Goodman, 2013).

The second motivation for mandating the ACT relates to the increasingly-popular belief that all high school graduates should be "college ready." In an environment where this view dominates, a college entrance exam serves as a natural assessment.

For CPS, the 2000-01 school year was the first year that students took the ACT. In practice, the 11th grade CPS students take the exams in April as part of the PSAE battery of tests (Ponisciak, 2005).

CPS Policy Changes

The ACT mandate arose from the NCLB legislation. But, in addition, CPS implemented two major policy changes in the mid-1990s.

First, incoming 9th graders in 1997-98 faced an enhanced set of graduation requirements relative to cohorts in the past so that all graduates of CPS were "college ready" (Mazzeo, 2010). These requirements included passing 4 years of English, 3 years of math (at least algebra I, geometry and algebra II), 3 years of lab science, and 3 years of social science. Algebra I and English I (or higher) were required courses for all 9th graders to ensure CPS students began and stayed on track to graduate.

Second, a policy enacted the year prior (1996-97) ended social promotion from 8th to 9th grades. Under this policy a minimum ITBS score was needed to enter 9th grade.[6] Students that did not achieve the minimum score in 8th grade were sent to summer school and took the test again at the end of the summer; if these students did not pass then they were sent to special high schools.

Overall Policy Changes

[6] The minimum score was a 7, meaning that the student had at least 7th grade academic skills.

In the overall picture of the policy changes, students in 9th grade cohorts in the years 1996-97 and later should all face the same graduation requirements, students that enter 9th grade in 1997-98 and later should all meet a base level of ITBS-measured skill, and students that enter 9th grade in 1998-99 and later take the ACT in 11th grade.

Identification

Our main source of identification will come from comparing educational outcomes of students in schools with low rates of always-compliers (pre-mandate) to schools with higher rates of always-compliers (pre-mandate). For example, one quarter of schools prior to the mandate had 40 percent or fewer students opt to take the ACT in the year 2000; once the mandate was enacted these schools saw the fraction of students taking the ACT increase by up to 50 percentage points.[7] Another quarter of schools had more than 75 percent of students opting to take the ACT prior to the mandate. The bite of the mandate will be smaller in these schools because presumably most of the students will already have their abilities revealed by the ACT through optional taking of the ACT.

However, confounding this channel is that the schools that are expected to have the biggest bite from the ACT mandate are also the schools that have the smallest social networks that can guide students toward a collegiate path. In our base difference-in-difference estimates we control for the extent of social networks by proxies described later in the model subsection.

In our base comparisons, we compare students that enter CPS 9th grade in 1997-98 (who are in 11th grade in 1999-00) to students that enter 9th grade in either 1998-99 (11th grade in 2000-01). Students from each of these cohorts need to meet the enhanced graduation requirements and all will have met a base ITBS exam score in order to enter 9th grade. But only the students that enter 9th grade in either 1998-99 or 1999-00 will have to take the ACT exam when they get to 11th grade (where a share of them will have potentially new information revealed to them about their overall skills and readiness for selective schools).

In our CPS data we know the ACT scores for CPS students post-2001. These scores will describe students who would have taken the ACT had there been no mandate (always-takers) and scores for students who would not have taken the test in the absence of the mandate (mandate compliers). We do not know the ACT scores of individual CPS students prior to 2001(when only

[7] It should be noted that even post-mandate there was not universal ACT coverage in CPS. By 2002 85 percent of CPS 11th grade students took the ACT, and 91 percent of 2004 11th graders took the exam.

the always-takers would have taken the ACT), but we do know the percent taking the ACT in each school in the pre-mandate period.

In the statewide distribution of ACT scores pre-and post-mandate (see figure 2 of Goodman, 2013) we observe that the ACT mandate pushed many low scoring students to take the ACT, and a considerable number of students who would not have taken the exam (mandate compliers) took the ACT post-mandate and scored higher than 18 (a typical minimum score for many non-competitive selective colleges), 20 (a typical minimum score for many somewhat selective colleges) and 24 (a typical minimum score for many selective colleges).

In CPS we see a similar pattern to the Illinois data: in the presence of the ACT mandate there are many new ACT takers, most of them score below 18, but a considerable number score between 18 and 24 (figure 1). In the CPS data, about 30 percent of 11th graders post-mandate (post-mandate) score above 18 on the (mandated) ACT.

Since we cannot identify the always-takers and the mandate-compliers in the post-mandate CPS data, we look to other sources of variation to tease them out. The main way that we can tease them out is to look by school: the schools with low ACT take-up rates in the pre-mandate period will contain a large number of mandate-compliers and smaller number of always-takers. Conversely, schools with high ACT take-up rates in the pre-mandate period will contain low rates of mandate compliers and high rates of always-takers. Thus, the change in ACT take-up rates between the pre- and post-mandate can help identify likely mandate-compliers.

Model

The main results will be based on a difference-in-difference estimator where the "pre" time period is pre-mandate, the "post" time period is post-mandate, the "treatment" group is students in low ACT take-up schools, and the "control" group are the non-low ACT take-up schools. The specification of such a model is:

(1) $m_{ist}=\alpha+\beta post_{ist}+\delta treatment_{ist}+\varphi post_{ist}*treatment_{ist}+\gamma X_{ist}+\varepsilon_{ist}$

where m is an outcome observed for individual student i in school s and time period t; post is a dummy for observations in the post-mandate time period, treatment is either a dummy or categorical variable that groups students by their exposure (or change in exposure) to the ACT, and X is a matrix of demographics and observable characteristics of the student.

The X matrix consists of demographic characteristics of students that are correlated with scholastic achievement and college attendance: sex, race/ethnicity, presence of parent in the home, and free-lunch eligibility. The matrix also contains variables about the median income level and the mean educational attainment of the student's Census block group, and either 8th grade ITBS scores or high school TAP test scores, and 9th grade measures of achievement and effort (GPA and absences).

We also proxy for the social networks that can influence a student's thoughts and actions about college by including the fraction of students in each school that attend college (though data begin in 2004), the mean GPA of students in each school during 11th grade, and the fraction of students that opted to take the ACT in the year prior to the ACT mandate (1999-00 school year).

Standard errors are at the school level.

We will supplement our linear analysis with the DiNardo, Fortin, and Lemieux (1997) re-weighting estimator. Conceptually the DFL estimator is simple: this method re-weights data from one point in time to give it the same demographic composition as is seen at another point in time. When the expected course rigor of the pre- and post-mandate samples are compared, the estimated counterfactual becomes "what would the density of course rigor have been among the 1998-99 9th graders if they had the grades, ITBS scores, TAP scores, and demographics of the 1997-98 9th graders (but retained their own decision rule to take rigorous courses)."

The outcome of interest (here, expected course rigor) and the regressor (here, grades, ITBS scores, TAP scores, and demographics) are assumed to have a joint distribution, so that as the regressor is observed more (or less) frequently, so will the outcome. Importantly, no parametric assumptions are placed on the formation of these outcomes and the estimator allows inferences to be drawn along all points of the distribution of outcomes. The estimator also forces estimates to be drawn from common support across the two samples.

Both observables and unobservables determine the outcome. The method assumes that the density of an outcome conditional on inputs and the density of the inputs are independent. The inputs are re-weighted while the conditional density remains unchanged, so the estimates rely on changes in observables only while keeping the distribution of unobservables unchanged. I assume that a change in the distribution of regressors will not change the distributional structure of the outcome (i.e. general equilibrium effects of the change in the regressors are assumed away).[8] This is a key assumption.

[8] Note that we allow unobservables to have a (possibly large) role in determining both the math major decision and the wage schedule. We assume that the effect says the same across cohorts, though. In the following paragraphs, I define $f(m|z,t)$ - it is this distribution that cannot respond to changes in z.

Begin by defining $M^t(z,u)$ as the function that relates observable (*z*) and unobservable (*u*) inputs to the outcome (*m*) at time *t*. Realizations of the outcome $m = M^t(z,u)$ and the conditional density of the outcome is $f(m \mid z)$. The observables are distributed according to $h(z)$ and unobservables are distributed as $g(u)$. At time *t* and given attributes *z*, the conditional density is $g(u \mid z,t)$.

Assumption III.1: $g(u \mid z,t) = g(u \mid z,s)$ for time = *t* and time = *s*.

At time t, the density of the outcome is:

$$f(m \mid z,t) = \int 1[(M^t(z,u) = m) \mid z,t] g(u \mid z,t) du$$

Using Assumption III.1, the distribution of the outcome at *t* is the same as at *s*:

$$f(m \mid z,t) = \int 1[(M^t(z,u) = m) \mid z,t] g(u \mid z,t) du = \int 1[(M^t(z,u) = m) \mid z,t] g(u \mid z,s) du = f(m \mid z,s)$$

The distribution of the outcome unconditional of *z* is: $f(m \mid z,t) = \int f(m,z \mid t) dz$, so $f(m \mid z,s) = \int f(m,z \mid s) dz = \int f(m \mid z,s) h(z \mid s) dz$. By assumption III.1,

$$f(m \mid s) = \int f(m \mid z,t) h(z \mid s) dz = \int \frac{f(m,z \mid t)}{h(z \mid t)} h(z \mid s) dz = \int f(m,z \mid t) \frac{h(z \mid s)}{h(z \mid t)} dz$$

and $f(m \mid s) = \int f(m,z \mid t) \psi(z) dz = \int f(m \mid z,t) h(z \mid t) \psi(z) dz$.

The re-weighting function is defined as a ratio of propensity scores:

$\psi(z) = \dfrac{\Pr(s \mid z)}{\Pr(t \mid z)} \dfrac{\Pr(t)}{\Pr(s)}$ where the p-scores are found from a probit regression. The CPS data sets are pooled and an indicator variable is generated to denote which of the two (1997-98 9th graders or 1998-99 9th graders) samples the observation is from. The probability of being a 9th grader in 1997-98 (or 1998-99), conditional on characteristics *z*, is computed in a probit regression.

As noted by DiNardo (2002), this re-weighting by a (ratio of) propensity scores allows the same benefits as Rosenbaum and Rubin (1983) propensity score matching. The problem lies in the fact that *z* is can be composed of many variables and integrating over many variables is cumbersome. The weight ($\psi(z)$) introduced above allows us to collapse a multidimensional integration problem (i.e. integration over each component of *z*) into a one-dimensional integration problem.

One can also decompose the effect that a subset of *Z* has on the outcome *y*. To use a concrete example, we can find the effect of changes in income on the expected retirement age while holding the other variables (assets, debts, demographics) constant. To do so, we can estimate the propensity scores conditional only on one variable of interest (call it z_1) and find the re-weighting function $\psi(z_1)$.

If we define $z = [z_1, z_2]$ then the distribution of z can also be written as the joint distribution of $[z_1, z_2]: F(z_1, z_2 \mid t_z = t) = \int dF(z_1 \mid z_2, t_z = t) dF(z_2 \mid t_z = t)$. This leads to re-writing $f(y; t_y = t, t_z = t)$ as $\int f(y \mid z_1, z_2, t_y = t) dF(z_1 \mid z_2, t_{z_1|z_2} = t) dF(z_2 \mid t_{z_2} = t)$, which implies that the counterfactual can be written as:

$$f(y; t_y = t, t_{z_2} = t, t_{z_1} = s) = \iint f(y \mid z_1, z_2, t_y = t) dF(z_1 \mid z_2, t_{z_1|z_2} = s) dF(z_2 \mid t_{z_2} = t)$$

$$= \iint f(y \mid z_1, z_2, t_y = t) \psi(z_1) dF(z_1 \mid z_2, t_{z_1|z_2} = t) dF(z_2 \mid t_{z_2} = t)$$

where $\psi(z_1)$ is a weighting function: $\psi(z_1) = \dfrac{dF(z_1 \mid z_2, t_{z_1|z_2} = s)}{dF(z_1 \mid z_2, t_{z_1|z_2} = t)}$.

IV. Results

Starting in 2000-2001, CPS 11th graders were required to take the ACT. Mandated taking of the ACT has been shown to increase the information available to all students and especially to low-income students that are prevalent in CPS. Thus, we may expect that students who receive this positive information shock will update their academic profile in 12th grade to impress the schools that they now realize they can attend.

In general, effort in 12th grade increased for the 11th graders that were impacted by the ACT mandate (table 2): more students progressed to 12th grade, graduated, had higher GPAs in 12th grade, had lower absences in 12th grade, had higher rates advanced coursework and elective math and science coursework in 12th grade.

These estimates, however, can be refined because we expect that schools with low fraction of students opting to take the ACT in the year prior to the mandate are schools with potentially many students that will receive this positive information shock. In other words, schools with low rates of always-compliers in the year prior to the ACT mandate are schools with the largest fraction of mandate compliers (by tautology) and have the largest fraction of students that will potentially get a positive information shock.

We estimate equation (1) via OLS to with categorical treatment variables defined as categorical variables that describe (a) the increase the fraction of students in a school that take the ACT (post versus pre mandate) and (b) the fraction of students in a school that took the ACT prior to the mandate. Our outcomes are high school graduation, GPA in 12^{th} grade, absences in 12^{th} grade, taking of advanced courses in 12^{th} grade, and opting to take elective math and science courses in 12^{th} grade (over and above the graduation requirements).

Across all schools, students that participated in the first year of the mandate had higher graduation rates, higher GPAs in 12^{th} grade, lower absences in 12^{th} grade, took more advanced courses in 12^{th} grade, and took more elective math and science courses in 12^{th} grade (row 1 of table 3).

In both the pre-and post-period, schools where the ACT rate increased by more than 10 percentage points tended to have lower graduation rates, lower rates of taking advanced courses, lower rates of taking elective math and science courses in 12^{th} grade, and higher absences, relative to schools where the ACT mandate had a small bite (rows 2-4 of table 3). In the discussion that follows, all estimates are relative to schools where the ACT rate increased by less than 10 percentage points. GPAs, though, tended to be higher in schools where the ACT rate increased by more than 10 percentage points.

Results are mixed for the impact of the mandate, though. In the post-period and relative to schools where the mandate pushed few students into taking the test, rates of high school graduation appear to increase more in schools where the ACT mandate moved more students into taking the test. But these estimates are not precisely estimated.

For GPAs, the largest impact of the mandate appeared in students at schools with moderate increases in ACT rates (between 10 to 20 percentage points). Most of these schools already had moderately high ACT rates prior to the mandate, so the established social networks at these schools may help enhance 12^{th} grade efforts at these schools after the mandate. Absences also decline in these schools and schools with larger increases in the fraction taking the ACT. Both of these changes may indicate increased effort in schools where the bite of the mandate was large.

The rate of increase in taking advanced courses was also highest in schools where the bite of the mandate was highest, indicating that more of these students may be seeking to enhance their high school transcripts for more selective schools. These results are not precisely estimated, though.

The rate of increase in elective math and science at schools where the bite of the mandate was largest (row 7) was as large as (or larger than) the omitted group. That is, that there was about a nine percentage point increase (0.085 plus 0.018) in the fraction of students taking elective math in these schools and at least a 5 percentage point increase in the fraction taking elective science courses.

Overall, the results in table 3 indicate a mixed set of results. Schools with the biggest bite from the mandate also saw a higher-than-usual fraction of students advance to the 12th grade and graduate high school (though this last estimate is imprecisely measured). Absences in 12th grade were lower and rates of advanced course taking were higher (though not statistically different from) schools where the bite was the smallest.

Students in schools with fairly large bite from the ACT mandate (those schools where ACT take-up rates increased 10 to 30 percentage points also saw a higher-than-usual fraction of students advance to the 12th grade and graduate high school, higher GPAs, lower absences in the post-mandate period. Yet, few of these estimates are statistically different from the estimates of students from schools with the smallest policy bite. And students from the schools with the smallest policy bite generally saw bigger increases in elective 12th grade math and science courses.

We use other measures of policy bite (unreported) and find the same general mixed set of results. Other measures of policy bit are students from low-income neighborhoods and low-education neighborhoods (that proxy for low information sets), and schools with low fraction of students in AP courses.

When we reweight the 2000-01 11th graders to have the same distribution of observables as the 1999-00 11th graders via DFL then we can see what the predicted effort of students in different schools would have been had there been no mandate and compare it to actual effort to gauge the impact of the mandate on students at various schools. Again, though, the results are at best inconclusive.

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Table 1. Summary stats of 11th grade cohorts in 1999 and 2000

	1999	2000
Male	0.46	0.46
White	0.13	0.12
Black	0.49	0.47
Hispanic	0.30	0.31
Other	0.05	0.05
Free lunch participant	0.79	0.80
Graduate (ever)	0.77	0.81
ITBS reading (8th grade)	239	244
ITBS math (8th grade)	248	248
TAP reading (10th grade)	49	49
TAP math (10th grade)	49	51
Mean family education (yrs.)	11.8	11.7
Median family income (thous. $2000)	39.3	39.6

Summary statistics of 1999-00 and 2000-01 11th graders in CPS. Mean family education and median family income are measured at Census block group level as of 2000 Census.

Table 2. Post-mandate estimates. 11th grade cohorts in 1999 and 2000 (pre- and post- groups)

	Progress to 12th	Ever grad	GPA in 12th	Absence in 12th	Adv. in 12th	Elec. Math 12th	Elec. Sci 12th
Post-mandate	0.053	0.024	0.039	-0.744	0.201	0.011	0.071
	(0.010)*	(0.007)*	(0.016)*	(0.158)*	(0.041)*	(0.018)	(0.019)*
Other variables							
Demographic	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Past course info	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Past TAP	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	20,480	20,480	16,751	16,874	16,604	16,581	16,675
R^2	0.18	0.16	0.37	0.20	0.30	0.07	0.05

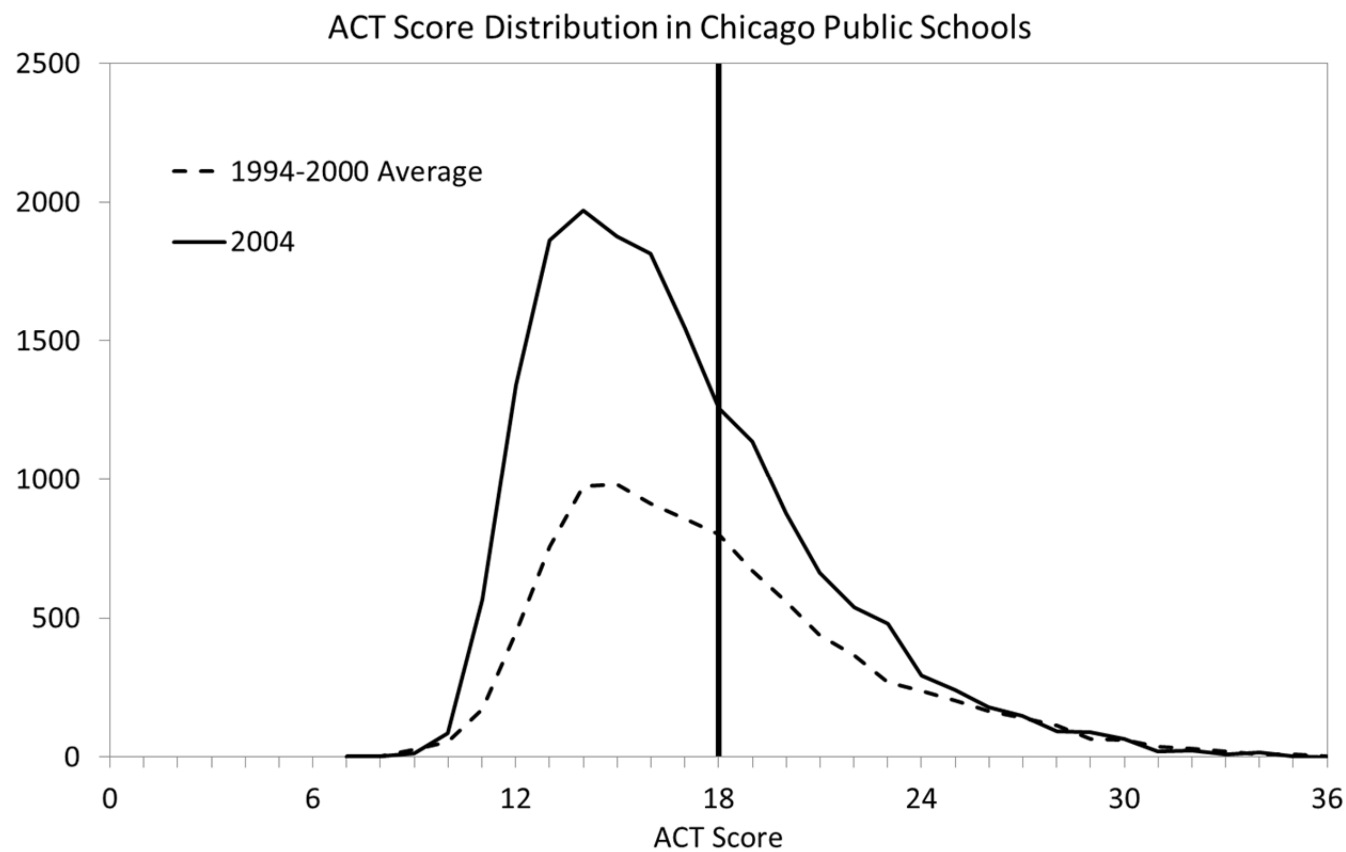
Note: Regressions at student-level, standard errors clustered at school level. Demographics are age, race/ethnicity/free lunch status, special ed status, presence of parent in home; 9th grade absences, GPA, advanced courses; TAP math percentile, TAP reading percentile, school-wide mean GPA, school-wide college attendance rate as of 2004.

Table 3. Difference-in-difference estimates. 11th grade cohorts in 1999 and 2000 (pre- and post-groups) and growth of ACT taking rates at school of attendance prior to the mandate (treatments)

	Progres to 12th	Ever grad	GPA in 12th	Absence in 12th	Adv. in 12th	Elec. Math 12th	Elec. Sci 12th
Post-mandate	0.033	0.012	0.016	-0.386	0.159	0.085	0.054
	(0.017)*	(0.011)	(0.023)	(0.210)*	(0.063)*	(0.044)*	(0.032)*
Increase in pct taking ACT from 1999-00 to 2000-01							
10 and 20 ppts.	-0.024	-0.007	0.022	0.047	-0.147	-0.148	-0.082
	(0.026)	(0.026)	(0.093)	(0.833)	(0.146)	(0.113)	(0.084)
20 and 30 ppts.	-0.009	-0.005	0.006	0.117	-0.129	-0.178	-0.133
	(0.027)	(0.028)	(0.078)	(1.210)	(0.134)	(0.136)	(0.086)
30+ ppts	-0.015	-0.005	0.075	1.748	0.030	-0.248	0.023
	(0.030)	(0.031)	(0.083)	(1.554)	(0.137)	(0.117)*	(0.084)
Interaction of post- and increase in ACT take-up rate							
10 and 20 ppts.	0.018	0.026	0.122	-0.490	-0.017	-0.021	0.030
	(0.027)	(0.019)	(0.032)*	(0.418)	(0.083)	(0.055)	(0.066)
20 and 30 ppts.	0.025	0.012	0.028	-0.955	0.102	-0.087	-0.029
	(0.021)	(0.016)	(0.034)	(0.416)*	(0.114)	(0.062)	(0.042)
30+ ppts	0.071	0.029	-0.049	-0.267	0.104	0.018	0.107
	(0.028)*	(0.027)	(0.053)	(0.569)	(0.096)	(0.069)	(0.092)
Other variables							
Demographic	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Past course info	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Past TAP	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	20,480	20,480	16,479	16,660	16,604	16,581	16,675
R^2	0.18	0.16	0.37	0.21	0.30	0.07	0.05

Note: Regressions at student-level, standard errors clustered at school level. Omitted group are students at school where ACT test taking rate increased less than 10 percentage points. Other variables as described in table 2.

Figure 1. ACT score distribution in Chicago Public Schools, pre-mandate (dashed line) and post-mandate (solid line)



Notes: Graph plots the number of test-takers with score s (scaled by class size). "1994-2000 Average" refers to the average calculated over even years only. Vertical line at 18 to reflect an admissions cutoff commonly used by selective colleges. This cutoff is approximately equal to a score of 870 on the SAT.