

**The Effects of Accountability Pressure on  
Student Achievement, Mobility, and School Attachment**

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School contexts are increasingly shaped by test-based accountability policies, which aim to improve student achievement and to close achievement gaps between advantaged and disadvantaged groups. A large body of work has now accumulated on the effects of accountability systems in K-12 education. One line of research has focused on its effects on student test scores and the distribution of these scores (Carnoy and Loeb 2002, Dee and Jacob 2009, Hanushek and Raymond 2004, Lauen and Ladd 2009, Neal and Schazenbach 2007, Reback 2008, Wong, Cook, and Steiner 2010). A second, largely separate line of work has asked how accountability systems affect school and teacher practice in intended and unintended ways (Booher-Jennings 2005, Jacob 2005, Hamilton et al. 2007, Marsh et al 2006, Stecher 2004).

Notably absent from the literature is the study of how these reforms have affected important outcomes beyond test scores, such as student mobility and school attachment (though see Anagnostopoulos 2006, Gillborn and Youdell 2000). In this paper, we address two research questions:

- 1) How does external pressure to increase student test scores affect students' math and reading achievement, school mobility, and school attachment, and how do these effects vary by race, gender, and socioeconomic status?
- 2) Through what mechanisms does accountability pressure produce these effects?

## **Data and Methods**

We analyze panel data for 6<sup>th</sup> through 9<sup>th</sup> grade students enrolled in the Chicago Public Schools (CPS) between 1994 and 2002. These administrative data consist of student demographic characteristics and school enrollment information as well as scores by year on the elementary/middle-school level Illinois Test of Basic Skills (ITBS) and the high-school level Test of Academic Proficiency (TAP). The Consortium on Chicago School Research (CCSR) collected student and teacher survey data at the elementary and high school levels in 1994, 1997, 1999, 2001, 2003 and 2005, and we have linked these data to the administrative data.

Our data incorporate the years preceding and following the implementation of a new accountability policy in Chicago. Beginning in 1997, CPS launched a school-level accountability program in step with a student-level retention program requiring students to advance from 3<sup>rd</sup>, 5<sup>th</sup> and 8<sup>th</sup> grades. The central feature of this program was the annual assignment of school "probation" status. Schools were flagged on probation for low aggregate student performance on ITBS and TAP exams; the assignment signaled the threat of possible future reconstitution or closure.

We investigate the effect of this "treatment" on student test scores, student mobility (defined as non-structural school moves; that is, not including moves from junior high school to high school), and school attachment. Our analysis of students' school attachment uses a set of student-teacher relationship questions that CCSR asked consistently across years from 1997 to 2001.

We first estimate the impact of accountability pressure on student math and reading scores, and determine whether the effect of accountability pressure varies across student types. Over the period of our data, we observe substantial within-school variation in probation status; 40 percent of schools were on probation for at least one year over the period 1997-2006. Because we are working with a student-level panel, we also observe within-student variation in exposure to

accountability pressure over time.

The measure of accountability pressure in our study is an indicator representing whether a school was on probation for a given school year. We expect that teachers would be under pressure to increase test scores the following year, and that this pressure may affect how teachers organize both instruction and their interactions with students in ways that will affect student achievement and school attachment. We also expect that some families may respond to the negative status of probation by moving their child to a different school.

Schools put on probation are different in many ways, however. To address this issue, our identification strategy relies on within-student variation in exposure to probation. We estimate student fixed effects regressions that take the form:

$$Y_{ijt} = \lambda_i + \beta_1 \text{Probation}_{jt} + \beta_2 X_{ijt} + \beta_3 S_{ijt} + Y_t + G_{ijt} + Y_t G_{ijt} + \varepsilon_{ijt}$$

In separate models, we predict  $Y_{ijt}$  (test score, student mobility, and school attachment outcomes) for student  $i$  in school  $j$  at time  $t$  as a function of whether the student's school was on probation during the school year, controlling for student fixed effects  $\lambda_i$ , student time-varying controls,  $X_{ijt}$ , school time varying controls,  $S_{ijt}$ , and year, grade, and year-by-grade fixed effects,  $Y_t$ ,  $G_{ijt}$ , and  $Y_t G_{ijt}$  respectively. We hypothesize that net of controls,  $\beta_1$  will be positive in models predicting test scores as schools attempt to avoid sanctions, positive in models in which we are predicting mobility between schools, and negative in models predicting school attachment. To determine whether these effects vary across groups, we plan to estimate the model above separately by race, poverty, and gender.

## Results

We first describe the CPS population, which consists mostly of African-American (52.4%) and Latino (33.2%) students. With four out of five Chicago students qualifying for free or reduced lunch, the district serves primarily poor students. Importantly, students are not evenly distributed across schools by race and class; most dramatically, 3 out of 4 African-American students attend schools with more than 75% African-American students, even though only half of the students in the district are African American. This segregated district landscape intersects with accountability policy so that specific groups are substantially more likely to experience accountability pressure. Table 1 displays, over the nine year period, the frequency of schools on probation by composition of African-American students. District-wide, 60% of schools never went on probation, which contrasts with the only 40% of highly-concentrated African-American schools that avoided probation. Although schools vary in their exposure to probation accountability, African-American students have had disproportionately high levels of exposure. Table 2 further describes the probation and non-probation population; as expected, students attending schools on probation have substantially lower levels of test performance and are more disadvantaged on a number of central demographic characteristics.

An assumption of our identification strategy is that schools actually responded to accountability pressure. Standardized test data corroborate this assumption, as demonstrated in Figure 1. We see that after the introduction of CPS accountability, students improved in both math and reading on the ITBS (6<sup>th</sup>-8<sup>th</sup> grade). The dramatic jump in scores beginning in the 1996-97 academic year illustrates the degree to which students and schools responded to accountability.

Our initial results suggest that the Chicago data are well suited for investigating the impact of accountability pressure on student outcomes. Between 12 and 18 percent of Chicago schools serving 6<sup>th</sup>-12<sup>th</sup> grade students were on probation in any given year, and over the period we study, nearly 40 percent of Chicago schools experienced probation at least once. Table 3 displays the results of our student fixed effects models, where the effect of probation is identified off of within-student variation in exposure to probation. Here we surprisingly find that probation has a small negative effect on student math performance and no effect on reading performance. Considered alongside the results presented in Figure 1, this suggests that the central change in school policy context was the implementation of any accountability policy, rather than facing direct pressure conditional on an accountability policy being in place. In future analyses, we will take advantage of two important features of these data - pre-accountability data, and the use of a clear proficiency cutoff for probation, which will allow us to assign treatment statuses to schools before the policy actually went into effect – to further explore this question. We will then use a difference-in-differences approach to estimate the total effect of the implementation of accountability on these outcomes.

Tables 4 and 5 begin to unpack the findings in Table 3 by describing the mobility patterns of students attending probation and non-probation schools and estimating parallel student fixed effects models to the above for mobility. We restrict our sample for this analysis to students in schools not currently on probation. We find that even with the strong test of within-student comparisons, students are more likely to move schools within CPS when their schools face probation pressure, suggesting that families are sensitive to this label. It seems plausible that the disruption caused by the exit of students, or potentially the composition of the students who exited (for example, higher achieving students), may have affected the school context in ways that produced the negative and null effects that we observe for math and reading, respectively. Our next analysis plans involve investigating the mobility finding more comprehensively, and estimating parallel models where school attachment is the outcome of interest.

Taken together, our preliminary findings suggest that accountability policy does have important effects on student achievement and student mobility, though not always in expected directions. We hope that our study will help build a more complete understanding of the effects of accountability systems on multiple educational outcomes that structure children's life chances.

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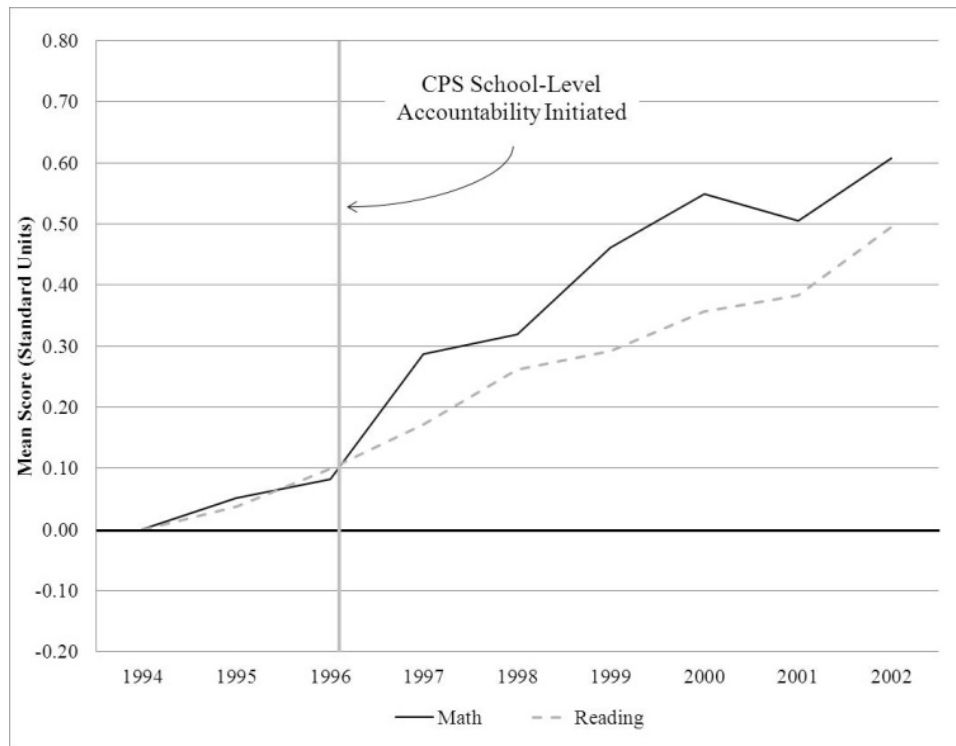
**TABLE 1. School Probation Frequency by African-American Student Composition<sup>1</sup>**

	# Schools, by % AA Students				All Schools
	0-25%	25-50%	50-75%	75+%	
# Years on Probation					
0 yrs	181	42	26	119	368
1-3 yrs	17	8	13	115	153
4-6 yrs	6	2	1	34	43
7-9 yrs	6	1	3	39	49
Total	210	53	43	307	613
% of Schools Never on Prob.	86.2%	79.2%	60.5%	38.8%	60.0%

Source: CCSR

1. Schools serving 6<sup>th</sup>-8<sup>th</sup> grade students, 1997-2005

**FIGURE 1. District Mean Standardized Scores, ITBS Exams (6<sup>th</sup>-8<sup>th</sup> Grade)<sup>1</sup>**



Source: CCSR

1. ITBS scaled scores standardized by 1994 mean and standard deviations, within grade level, and then averaged (weighted by student population) across 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grades.

**TABLE 2. Descriptive Statistics of 6th-8th Grade Math Students, 1997 to 2002<sup>1</sup>**

	Probation Status of Current School of Attendance					
	No Probation (n=365,473)		Probation (n=36,117)		Total (n=401,590)	
	Mean	SD	Mean	SD	Mean	SD
<b>Student Performance</b>						
ITBS Math Score	0.259	0.909	-0.241	0.770	0.214	0.909
ITBS Math Score, Previous Year	0.247	0.925	-0.282	0.768	0.199	0.925
<b>Student Characteristics</b>						
Female	0.528	0.499	0.534	0.499	0.529	0.499
African American	0.500	0.500	0.877	0.328	0.534	0.499
Asian	0.036	0.186	0.001	0.035	0.033	0.178
Latino	0.351	0.477	0.117	0.322	0.330	0.470
Native American	0.002	0.044	0.000	0.020	0.002	0.042
White	0.111	0.315	0.004	0.061	0.102	0.302
Special education	0.015	0.120	0.014	0.118	0.015	0.120
Non-family guardian	0.038	0.191	0.073	0.260	0.041	0.198
Bilingual program	0.078	0.268	0.047	0.212	0.075	0.264
Free/Reduced Lunch	0.830	0.376	0.961	0.193	0.842	0.365
Repeat Grade	0.033	0.179	0.070	0.255	0.036	0.187

Source: CCSR

Notes:

1. ITBS Reading students are an overlapping population with almost identical descriptive statistics; they have been excluded to conserve space.



**TABLE 3. Effect of School Probation Status on ITBS Scores, 6th-8th Grade 1997-2002<sup>1</sup>**

Independent Variable:	Student FE, Change in ITBS Score	
	Math	Reading
School on Probation		
Coefficient	-0.028***	0.005
Standard Error	(0.004)	(0.005)
N	401,590	402,897

Source: CCSR

\*p<0.05 \*\*p<0.01 \*\*\*p<0.001

Notes:

1. Selected results from two student fixed-effect models that regress ITBS Math (I) and ITBS Reading (II) scores (standard units) on school probation status, prior-year score, student covariates, grade and year. Student time-varying covariates include: bilingual status, qualification for free or reduced lunch, special education status, and an indicator variable for students with non-family-member guardians. Both models exclude students not “officially” considered for school probation status by CPS standards and those students without multiple consecutive years of testing data.

**TABLE 4. Descriptive Statistics for CPS Students Attending “Non-Probation” Schools at Time  $t$ , 1996-2001<sup>1</sup>**

	6 <sup>th</sup> -7 <sup>th</sup> Grade Students (n=320,915)		9 <sup>th</sup> -11 <sup>th</sup> Grade Students (n=255,472)	
	Mean	SD	Mean	SD
Next year ( $t+1$ ):				
Current school will go on probation	0.040	0.195	0.176	0.380
Student will leave current school	0.213	0.409	0.208	0.406
Switch schools within district	0.145	0.352	0.048	0.213
Leave district (move, drop, private)	0.068	0.251	0.161	0.367
Student characteristics:				
Female	0.499	0.500	0.525	0.499
African American	0.497	0.500	0.509	0.500
Asian	0.034	0.182	0.053	0.225
Latino	0.347	0.476	0.291	0.454
Native American	0.002	0.045	0.002	0.046
White	0.120	0.325	0.144	0.352
Special education	0.145	0.352	0.097	0.296
Non-family guardian	0.043	0.202	0.028	0.164
Bilingual program	0.147	0.354	0.080	0.271
Free, Reduced Lunch	0.841	0.366	0.732	0.443

Source: CCSR

**TABLE 5. Fixed Effect Estimates of School Becoming “On Probation” on Student Mobility, 1996 to 2001<sup>1</sup>**

Next Year Student Enrollment Outcome ( $t+1$ ):	6 <sup>th</sup> -7 <sup>th</sup> Grade Students		9 <sup>th</sup> -11 <sup>th</sup> Grade Students	
	Coeff.	SE	Coeff.	SE
Leaves School	0.206***	(0.009)	0.188***	(0.008)
Changes Schools within District	0.214***	(0.008)	0.190***	(0.005)
Leaves District	-0.008*	(0.004)	-0.002	(0.007)

Source: CCSR

\* $p < 0.05$  \*\* $p < 0.01$  \*\*\* $p < 0.001$

Notes:

1. Selected results from six student fixed-effect linear probability models for three variations of student mobility and for two select populations: 6<sup>th</sup>-7<sup>th</sup> grade students and 9<sup>th</sup>-11<sup>th</sup> grade students. For each model, the future ( $t+1$ ) school enrollment (binary) is regressed on the future ( $t+1$ ) status of the school that the student currently ( $t$ ) attends, controlling also for covariates, grade and year. Student covariates include: bilingual status, qualification for free or reduced lunch, special education status, and an indicator variable for students with non-family-member guardians. Importantly, only students attending non-probation schools (at time  $t$ ) are included, to capture the effect of a school becoming “on probation.” Note also that the transition from 8<sup>th</sup> to 9<sup>th</sup> grade, a structural change from Elementary/Middle to High School, has been excluded.