THE HAMILTON PROJECT

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The Power and Pitfalls of Education Incentives

Bradley M. Allan and Roland G. Fryer, Jr.

MISSION STATEMENT

The Hamilton Project seeks to advance America's promise of opportunity, prosperity, and growth.

We believe that today's increasingly competitive global economy demands public policy ideas commensurate with the challenges of the 21st Century. The Project's economic strategy reflects a judgment that long-term prosperity is best achieved by fostering economic growth and broad participation in that growth, by enhancing individual economic security, and by embracing a role for effective government in making needed public investments.

Our strategy calls for combining public investment, a secure social safety net, and fiscal discipline. In that framework, the Project puts forward innovative proposals from leading economic thinkers — based on credible evidence and experience, not ideology or doctrine — to introduce new and effective policy options into the national debate.

The Project is named after Alexander Hamilton, the nation's first Treasury Secretary, who laid the foundation for the modern American economy. Hamilton stood for sound fiscal policy, believed that broad-based opportunity for advancement would drive American economic growth, and recognized that "prudent aids and encouragements on the part of government" are necessary to enhance and guide market forces. The guiding principles of the Project remain consistent with these views.

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The Power and Pitfalls of Education Incentives

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SEPTEMBER 2011

NOTE: This discussion paper is a proposal from the author. As emphasized in The Hamilton Project's original strategy paper, the Project was designed in part to provide a forum for leading thinkers across the nation to put forward innovative and potentially important economic policy ideas that share the Project's broad goals of promoting economic growth, broad-based participation in growth, and economic security. The authors are invited to express their own ideas in discussion papers, whether or not the Project's staff or advisory council agrees with the specific proposals. This discussion paper is offered in that spirit.

BROOKINGS

Abstract

There is widespread agreement that America's school system is in desperate need of reform, but many educational interventions are ineffective, expensive, or difficult to implement. Recent incentive programs, however, demonstrate that well-designed rewards to students can improve achievement at relatively low costs. Fryer and Allan draw on school-based field experiments with student and teacher incentives to offer a series of guidelines for designing successful educational incentive programs. The experiments covered more than 250 urban schools in five cities and were designed to better understand the impact of financial incentives on student achievement. Incentives for inputs, such as doing homework or reading books, produced modest gains and might have positive returns on investment, and thus provide the best direction for future programs. Additionally, this paper proposes directions for future incentive programs and concludes with implementation guidelines for educators and policymakers to implement incentive programs based on the experiments' research findings and best practices. Incentive programs are not enough to solve all the problems in America's educational system, but they can definitely play a role in the larger solution.

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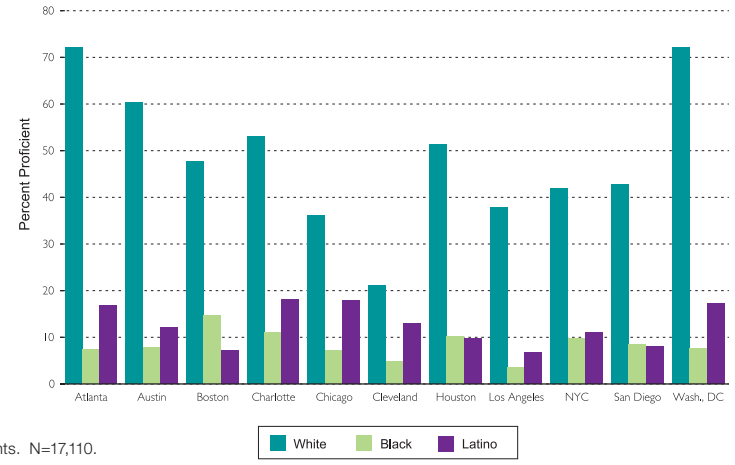
Chapter 1: Education in America

Many believe that there is a "crisis" in American education. On the Program for International Student Assessment (OECD 2009), out of thirty-four countries, our ninth graders rank twenty-fifth in math, seventeenth in science, and fourteenth in reading achievement.[1] Seventy percent of American students graduate from high school, which ranks the United States in the bottom quartile of OECD countries (OECD 2007). In large urban areas with high concentrations of blacks and Latinos, educational attainment and achievement are even bleaker, with graduation rates as low as 38 percent in Detroit and 31 percent in Indianapolis (Swanson 2009). Of the eighteen districts in the National Assessment of Educational Progress (NAEP) Trial Urban District Assessment (TUDA) sample, at least half of the black students in fourteen of these districts score at the "below basic" level on eighth-grade math. And, as Figure 1 demonstrates, there is not a major city in the United States in which even one fourth of black or Latino eighth graders are proficient in reading or math. In Detroit, for example, only 4 percent of black fourth graders are proficient in math; by eighth grade, only 3 percent are proficient. The performance of black and Latino students on international assessments is roughly equal to national performance in Mexico and Turkey—two of the lowest-performing OECD countries.

FIGURE 1

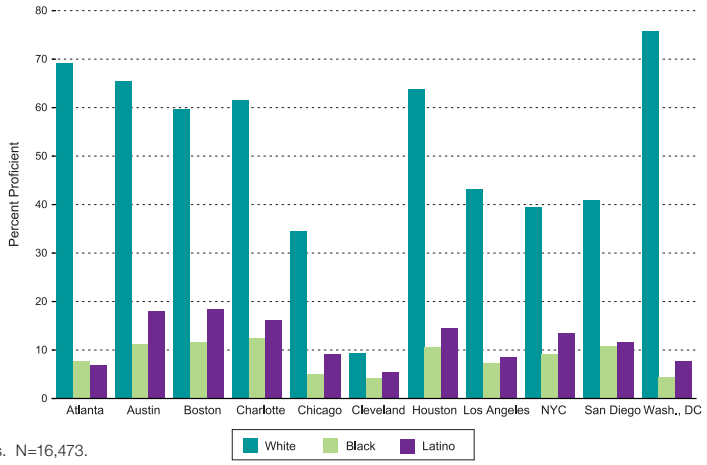
Racial Differences in Achievement on NAEP, 8th Grade

Reading



Note: All means are calculated using sample weights. N=17,110.

Mathematics



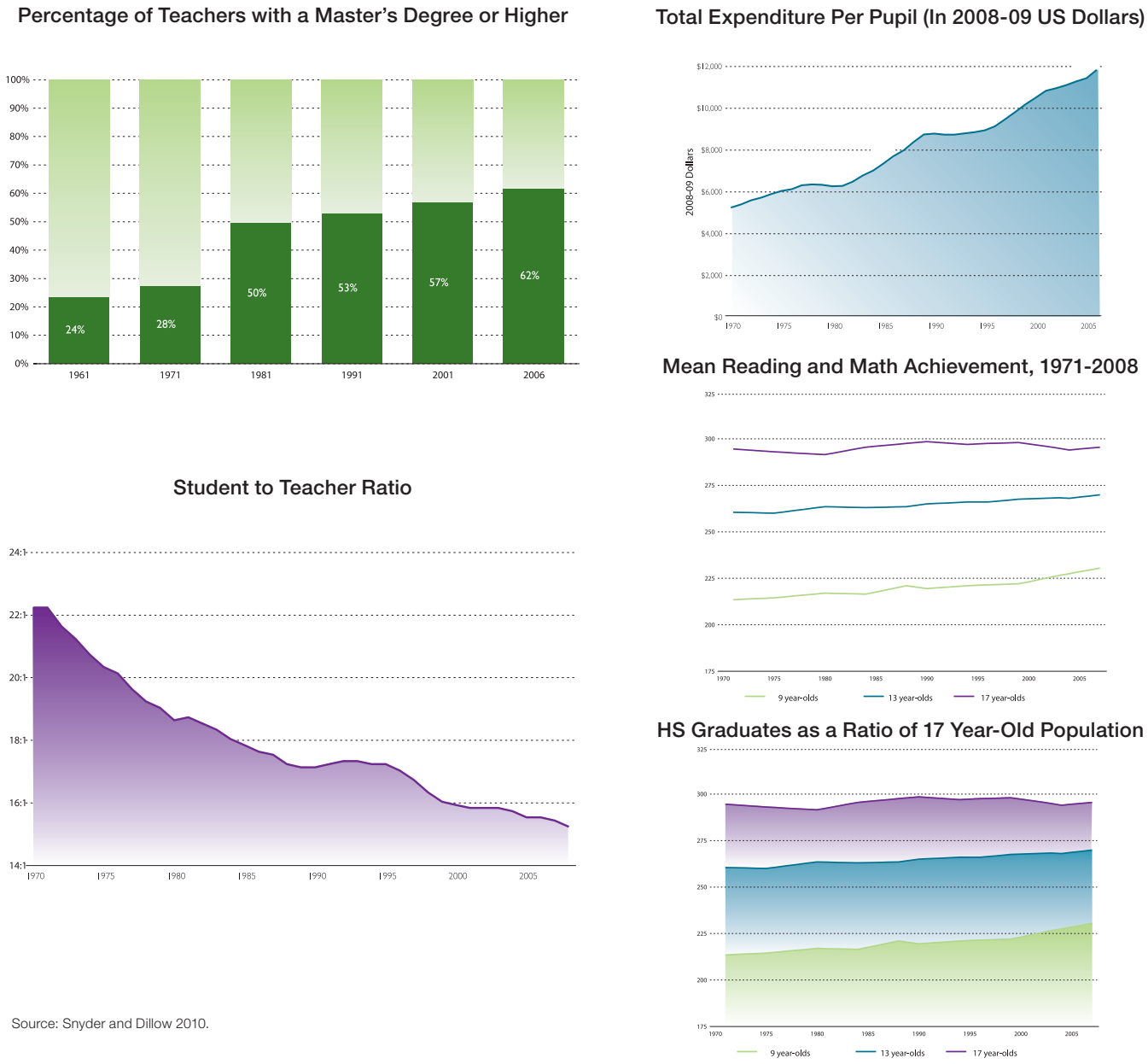
Note: All means are calculated using sample weights. N=16,473.

Source: Fryer 2010.

In an effort to increase achievement and narrow differences between racial groups, school districts have become laboratories for reforms. These reforms include smaller schools and classrooms (Krueger 2003; Nye, Fulton, Boyd-Zaharias, and Cain 1995); mandatory summer school (Jacob and Lefgren 2004); after-school programs (Lauer, Akiba, Wilkerson, Apthorp, Snow, and Martin-Glenn 2006); budget, curricula, and assessment reorganization (Borman, Slavin, Cheung, Chamberlain, Madden, and Chambers 2007); policies to lower the barrier to teaching via alternative paths to accreditation (Decker, Mayer, and Glazerman 2004; Kane, Rockoff, and Staiger 2008); single-sex education (Shapka and Keating 2003); data-driven instruction (Datnow, Park, and Kennedy 2008); ending social promotion (Greene and Winters 2006); mayoral or state control of schools (Henig and Rich 2004; Wong and Shen 2002, 2005); instructional coaching (Knight 2009); local school councils (Easton, Flinspach, O'Connor, Paul, Qualls, and Ryan 1993); reallocating per pupil spending (Guryan 2001; Marlow 2000); providing more culturally sensitive curricula (Banks 2001, 2006; Protheroe and Barsdate 1991; Thernstrom 1992); renovated and more technologically

FIGURE 2

Conventional Wisdom Has Failed – Despite well-intentioned and intuitive reforms, performance has been flat since the 1970s.



Source: Snyder and Dillow 2010.

savvy classrooms (Goolsbee and Guryan 2006; Krueger and Rouse 2004); professional development for teachers and other key staff (Boyd, Grossman, Lankford, Loeb, and Wycko 2008; Rockoff 2008); and increasing parental involvement (Domina 2005).

Consider Figure 2. In 1961, 23.5 percent of teachers had a master's degree or higher. In 2001, 56.8 percent of teachers had at least a master's degree. Student-to-teacher ratios in public schools have decreased from more than 22 to 1 in 1970 to 16 to 1 in 2000, a decrease of almost 30 percent in class size in thirty years. America spends more on education than ever: per pupil spending has increased (in 2008–2009 dollars) from approximately $5,200 per student in 1970 to more than $12,000 in 2007 (Snyder and Dillow 2011). Despite these and many other intuitive efforts in the past three decades to increase student achievement, even the most reform-minded districts have shown little progress.

One potentially cost-effective strategy that has received considerable attention recently is providing short-term financial incentives for students, teachers, parents, or principals to achieve or exhibit certain behaviors correlated with student achievement. Theoretically, providing such incentives could have one of three possible effects. (1) If individuals lack sufficient motivation, dramatically discount the future, or lack accurate information on the returns to schooling to exert optimal effort, then providing incentives for achievement will yield increases in student performance. (2) If individuals lack the structural resources or knowledge to convert effort to measurable achievement or if their success depends on forces out of their control (e.g., effective teachers, motivated students, engaged parents, or peer dynamics), then incentives will have very little impact. (3) Some argue that financial rewards for students (or any type of external reward or incentive) will undermine intrinsic motivation and lead to negative outcomes.

Between the 2007–2008 and 2010–2011 school years, we conducted incentive experiments in public schools in five prototypically low-performing urban school districts—Chicago, Dallas, Houston, New York City, and Washington, DC—distributing a total of $9.4 million to roughly 36,000 students in 250 schools (including treatment and control schools).[2] All experiments were randomized control trials that varied from city to city on several dimensions: what was rewarded, how often students were given incentives, the grade levels that participated, and the magnitude of the rewards. The key features of each experiment consisted of monetary payments to students, teachers, parents—and sometimes all three—for performance according to a simple incentive scheme. The incentive schemes were designed to be simple and politically feasible. It is important to note at the outset that these incentive schemes barely scratch the surface of what is possible. We urge the reader to interpret any results as specific to these incentive schemes and refrain from drawing more general conclusions. Many more programs need to be tried and evaluated before we can form more general conclusions about the efficacy of incentives writ large.

The goal of this paper is three-fold. First, we provide an overview of the literature on incentives in education and develop a broad sense of the potential power (or, in many cases, lack thereof) of incentives as a tool in a reformer's toolkit. Second, using the experimental evidence as a guide, we develop a list of "10 Do's and Don'ts" for the use of incentives in education. Third, we provide a "How To" guide for policymakers or school districts that are interested in implementing financial incentives for teachers, students, or parents. In all sections, we draw on scholarly work from Fryer (forthcoming), which provides additional analysis of education incentive experiments.

We begin by providing some key details of our experiments on incentives and their implementation in five cities (see Fryer (forthcoming) for further details). We concentrate on the incentive experiments implemented by the Education Innovation Laboratory at Harvard University (EdLabs) because of our access to important information about every phase of the implementation and evaluation process, which allows more adequate comparisons across experimental sites. Chapters 2 and 3 provide a high-level summary of the results of these experiments and how they compare with estimates gleaned from other experimental analyses. Based on our set of incentive experiments for students and teachers and the literature, Chapter 4 exposits "10 Do's and Don'ts" of education incentive programs. Chapter 5 offers considerations for evaluating incentive programs in the future, and Chapter 6 is an implementation supplement that provides guidelines for structuring and implementing an incentive program.

America spends more on education than ever: per pupil spending has increased from approximately $5,200 per student in 1970 to more than $12,000 in 2007.

Chapter 2: Student Incentive Program Details and Results

This section examines the evidence on student incentive programs. Students in cities across the United States were paid for inputs, such as reading books, completing math assignments, and attending school, or for outputs, such as grades and test scores. Although programs rewarding outputs showed no significant results, incentive programs can be a cost-effective strategy to raise achievement if the incentives are targeted for effective inputs, such as reading books and completing math assignments.

STUDENT INCENTIVE PROGRAM DESIGN

Table 1 provides an overview of each experiment and specifies conditions for each site. In total, experiments were conducted in 250 schools across five cities, distributing $9.4 million to roughly 36,000 students. In all cities, the students in the experimental sample were predominantly black or Latino. In all cities except Washington, DC, more than 90 percent of students were free lunch eligible, meaning that they were

TABLE 1

Student Incentive Treatments by School District

	Reward Structure	Amounts Earned	Operations
A. Input Experiments			
Dallas (2nd graders)	Students earned $2 per book to read books and pass a short test to ensure they read it.	Average: $13.81 Max: $80	$126,000 total cost. 80% consent rate. One dedicated project manager.
Washington DC (6th-8th graders)	Students were rewarded for meeting behavioral, attendance, and performance-based metrics. They could earn up to $100 every two weeks - up to $1500 for the year.	Average: $532.85 Max: $1322	$3,800,000 distributed. 99.9% consent rate. 86% of students understood the basic structure of the program. Two dedicated project managers.
Houston (5th graders)	Students and parents earned $2 for each math objective the student mastered by passing a short test, and parents earned $20 for each teacher conference attended.	**Student** Average: $228.72 Max: $1392 **Parent** Average: $254.27 Max: $1000	$870,000 distributed. 99.9% consent rate. Two dedicated project managers.
B. Output Experiments			
NYC (4th graders and 7th graders)	Students were paid for interim tests similar to state assessments. 4th graders could earn up to $25 per test and $250 per year. 7th graders could earn up to $50 per test and $500 per year.	**4th grader** Average: $139.43 Max: $244 **7th grader** Average: $232 Max: $495	$1,600,000 distributed. 82% consent rate. 90% of students understood the basic structure of the program. 66% opened bank accounts. Three dedicated project managers.
Chicago (9th graders)	Students earned money for their report card grades. The scheme was A=$50, B=$35, C=$20, D=$0, and F=$0 (and resulted in $0 for all classes). They could earn up to $250 per report card and $2,000 total. Half of the rewards were given immediately; the other half at graduation.	Average: $422.93 Max: $1000	$3,000,000 distributed. 88.97% consent rate. 91% of students understood the basic structure of the program. Two dedicated project managers

Notes: Each column describes a different aspect of treatment. Entries are school districts where the experiments were held. See Fryer (forthcoming) for further details.

economically disadvantaged. In Washington, DC, more than 70 percent of students fit this criterion.

The incentives can be divided into two general categories: incentives for inputs and incentives for outputs. The output of interest is student achievement, which is measured through test scores or class grades. An input is anything that can contribute to student learning. Generally, this category includes high-quality teachers, a safe learning environment, and student effort. In Dallas, Houston, and Washington, DC, students were paid for inputs that were under their control. These included tasks such as reading books, doing homework, attending school, or wearing a school uniform. In New York City and Chicago, incentives were based on outputs.

The input experiments in Dallas, Houston, and Washington, DC offered students incentives for either engaging in positive behaviors or completing certain tasks. In Dallas, students were rewarded for reading books and completing quizzes based on the books. Students were allowed to select and read books of their choice at the appropriate reading level and at their leisure. Students were paid $2 for each book they read for up to twenty books per semester.

Student incentives in Washington, DC, were based on a combination of five inputs, including attendance and behavior.[3] A typical scheme included attendance, behavior, wearing a school uniform, homework, and class work. Students were given as much as $10 per day for satisfying the five criteria.[4]

The Houston experiment applied incentives to students, parents, and teachers. Students were given customized math assignments that focused on their areas of weakness. Students worked on these assignments at home with their parents or at school outside of regular school hours and then took a quiz to show that they had mastered the content. They earned $2 for each quiz they passed. Teachers could hold eight conferences each year to update parents on their child's progress. Both parents and teachers were paid for each conference that they attended. Parents could also earn money if their child passed quizzes, as long as they attended at least one conference. In addition, teachers and principals were both eligible for bonuses through the HISD (Houston Independent School District) ASPIRE (Accelerating Student Progress Increasing Results and Expectations) program.

The output incentive programs paid students for test scores and grades. In New York City, students took ten interim assessments. For each test, fourth graders earned $5 plus an amount proportional to their score. The magnitude of the incentive was doubled for seventh graders. In Chicago, students were paid for their grades in five core courses.[5]

STUDENT INCENTIVE PROGRAM RESULTS

Table 2 presents the results from the experiments described above and includes estimates from the literature. The final columns report intent-to-treat (ITT) estimates from the experiments. The ITT estimates capture the impact of being *offered a chance* to participate in a financial incentive program, not of actually participating. An important potential limitation of this set of experiments is that it was designed to capture relatively large effects, and so some incentive programs may generate positive returns even though they do not show statistically significant results.[6]

Incentives can be a cost-effective strategy to raise achievement among even the poorest minority students in the lowest-performing schools.

TABLE 2

Average Effects of Student Incentive Programs

	Incentive	Outcome	Effect in Standard Deviations	Effect in Months of Schooling
A. Input Experiments				
Dallas	$2 per book	ITBS 2nd grade Reading Comp.	0.180**	2.250**
			(0.075)	(0.938)
		Logramos 2nd grade Reading Comp.	-0.165*	-2.063*
			(0.090)	(1.125)
Washington DC	Up to $100 per week for school-determined goals	DC-CAS 6th-8th grade Reading	0.142	1.775
			(0.090)	(1.125)
		DC-CAS 6th-8th grade Math	0.103	1.288
			(0.104)	(1.300)
Houston	$2 per math objective	Accelerated Math Objectives Mastered	0.985***	_____
			(0.121)	
		TAKS 5th Grade Math	0.074*	0.925*
			(0.044)	(0.550)
B. Output Experiments				
NYC	Up to $250 for test results	NY State Assmt. 4th grade ELA	-0.026	-0.325
			(0.034)	(0.425)
		NY State Assmt. 4th grade Math	0.062	0.775
			(0.047)	(0.588)
	Up to $500 for test results	NY State Assmt. 7th grade ELA	0.004	0.050
			(0.017)	(0.213)
		NY State Assmt. 7th grade Math	-0.031	-0.388
			(0.037)	(0.463)
Chicago	Up to $250 per report card for grades	PLAN 9th grade Reading	-0.006	-0.075
			(0.028)	(0.350)
		PLAN 9th grade Math	-0.010	-0.125
			(0.023)	(0.288)
C. Other Incentive Programs				
Rural Ohio	Cash for test scores	Terra Nova, Ohio Achievement, Math	0.133**	1.663**
			(0.049)	(0.609)
Kenya	Scholarships for test scores	Kenya Cert. of Primary Ed. Exam	0.12**	1.50**
			(0.07)	(0.88)
Israel	Cash for test scores	Bagrut HS Matriculation Exam	0.067*	0.838*
			(0.036)	(0.450)

Notes: The first three columns describe the treatment and its location. The last two columns are intent-to-treat estimates of the effect of being offered a chance to participate in treatment on the outcome listed in column three. All regressions control for demographic factors and previous test scores and include all members of the experimental group with non-missing reading or math test scores. Results marked with *, **, and *** are significant at the 10%, 5%, and 1 percent levels, respectively. Entries are school districts where the experiments were held. Conversion factor of 0.08 standard deviations=1 month of schooling. See Fryer (forthcoming) for further details.

Results are reported in standard deviations (Column 4) and months of schooling (Column 5). A standard deviation is the distance between ranking in the middle of the class and ranking at the 84th percentile. A student typically improves by about 1.0 standard deviation over the course of 1.4 years academic school years, or 12.5 months. Figure 3 summarizes the results of all the incentive experiments.

Figure 3 (and the first three rows of table 2) demonstrate that incentives can be a cost-effective strategy to raise achievement among even the poorest minority students in the lowest-performing schools if the incentives are given for certain inputs to the educational production function. Paying students to read books yields large and statistically significant increases in reading comprehension. Paying students for attendance, good behavior, wearing their uniforms, and turning in their homework yields a similar estimate; due to imprecision, however, the effects are not statistically significant.

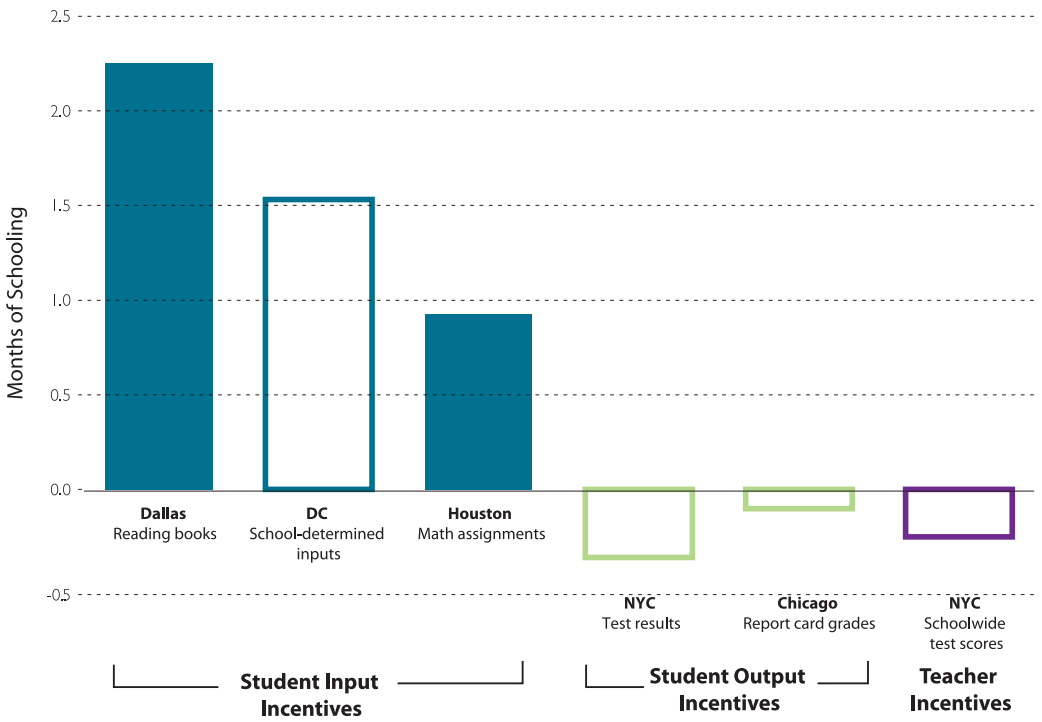
In Houston, where parents, students, and teachers were all given incentives for a student's mastery of math objectives, students who were given incentives mastered 125 percent more objectives than did students who were not given incentives. However, because the focus of the math quizzes was not tightly aligned with the topics that appeared on the statewide test, the effects on measured mathematics achievement on the state test were more muted.[7]

Conversely, the output experiments demonstrate less-promising results. Paying for performance on standardized tests in New York City did not significantly affect test scores in math or reading. Rewarding ninth graders in Chicago for their grades similarly has no effect on achievement test scores in math or reading.

These experimental results are broadly consistent with international results that show mixed effects for output incentives. Kremer, Miguel, and Thornton (2009) evaluated a merit scholarship program in Kenya, where girls in the top 15 percent of the two participating districts received scholarships to offset school fees. They found that the program raised test scores by 0.13 standard deviations. Angrist and Lavy (2009) examined a program in Israel that offered scholarships to students from low-achieving schools for passing the Bagrut, but they do not find significant effects.[8]

FIGURE 3

Impact of Incentive Programs on Student Achievement



Notes: Solid bars represent impacts that are extremely unlikely to have occurred through chance. These results are statistically significant at the 10% level. Results are impacts on standardized tests, averaged over subjects and grade levels where applicable. See Fryer (forthcoming) for further details.

Source: Fryer (forthcoming) and data from the authors.

Chapter 3: Teacher Incentive Program Details and Results

Experiments with teacher incentive programs in the United States, such as one in New York City, find that financial incentives given to teachers for student achievement are not effective. This result may depend on the structure of the particular incentive program tested. A great deal more research is needed on the efficacy of teacher incentives.

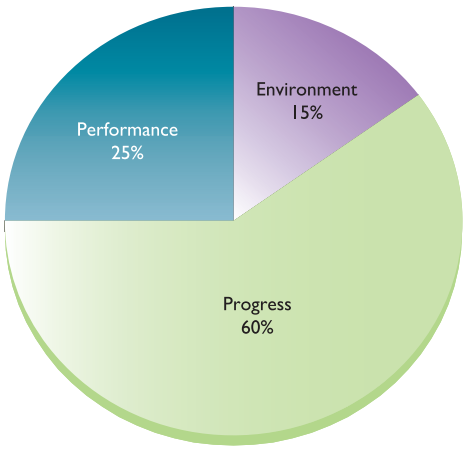
NEW YORK CITY

On October 17, 2007, New York City's mayor, schools chancellor, and the president of the United Federation of Teachers (UFT) announced an initiative to provide teachers with financial incentives to improve student performance, attendance, and school culture. Schools that met their achievement target would be awarded $3,000 per teacher, and schools that met 75 percent of their target would receive $1,500 per teacher. Each school decided at the beginning of the year how the bonus would be distributed among teachers and other staff, but incentives were not allowed to be distributed according to seniority. Schools could have chosen to distribute the incentives to teachers based on which classes showed the most improvement in students' achievement, but instead an overwhelming majority of schools chose an incentive scheme that gave teachers more or less the same award, varied only by position held in the school.

Figure 4 shows how the progress report card score, which is the basis for awarding incentives to schools, is calculated. In each of the three categories—learning environment, student performance, and student progress—schools were evaluated by their relative performance in each metric compared to their peer schools and all schools in the city, with performance relative to peer schools weighted three times as heavily as performance relative to all schools citywide. However, because it is calculated using many metrics and because scores in each metric are calculated relative to other schools, it is not obvious how much effort is needed to raise the progress report card score by, say, one point.

FIGURE 4

Progress Report Card Metrics



Subscore	Example Criteria
Environment	5% Attendance, 10% Learning Environment Survey results
Progress	*Elementary/Middle schools:* Average change in state exam proficiency rating among level 1 and 2 students, average change in state exam proficiency ratings among level 3 and 4 students, percentage of students making a year of progress among the bottom third
	High schools: Percentage of students earning more than 10 credits among the bottom third, weighted Regents pass rates, average completion rates of remaining Regents
Performance	*Elementary/Middle schools:* Proportion of students at state ELA and math exam performance level 3 or 4, state exam median proficiency ratings
	High schools: 4- and 6-year graduation rates, diploma-weighted graduation rates

Source: New York Department of Education (2011a, 2011b).

Results of the New York City teacher incentive scheme are presented in Table 3, and the total effect is compared to the impacts of student incentives in Figure 3. Across eight outcomes, there is no evidence that teacher incentives increase student performance, attendance, or graduation, nor is there any evidence that the incentives change teacher behavior. If anything, the evidence suggests that teacher incentives may decrease student achievement, especially in larger schools.

TABLE 3

Average Effects of Teacher Incentive Programs

	Elementary		Middle School		High School	
Outcome	**Standard Deviations**	**Months of Schooling**	**Standard Deviations**	**Months of Schooling**	**Standard Deviations**	**Months of Schooling**
A. Effects on Student Achievement						
NY State Assessment ELA	-0.011	-0.138	-0.032**	-0.400**	---	---
	(0.020)	(0.250)	(0.011)	(0.138)		
NY State Assessment Math	-0.015	-0.188	-0.048**	-0.600**	---	---
	(0.024)	(0.300)	(0.017)	(0.213)		
Regents Exam ELA	---	---	---	---	-0.003	-0.038
					(0.044)	(0.550)
Regents Exam Math	---	---	---	---	-0.011	-0.138
					(0.031)	(0.388)
Attendance Rate	-0.018	---	-0.019	---	-0.014	---
	(0.020)		(0.022)		(0.050)	
GPA	-0.001	---	0.001	---	-0.004	---
	(0.040)		(0.031)		(0.029)	
4-year Graduation Rate	---	---	---	---	-0.044**	---
					(0.021)	
B. Effects on Teacher Behavior						
Retention in District	0.002	---	-0.006	---	---	---
	(0.006)		(0.011)			
Retention in School	-0.007	---	-0.027	---	---	---
	(0.021)		(0.017)			
Personal Absences	0.275	---	-0.440	---	---	---
	(0.212)		(0.403)			

Notes: The first column describes the outcome of interest for that row. The last five columns are intent-to-treat estimates of the effect of being offered a chance to participate in treatment on the outcome listed in column one. All regressions control for demographic factors and previous test scores and include all members of the experimental group or subgroup with non-missing reading or math test scores. Results marked with *, **, and *** are significant at the 10%, 5%, and 1 percent levels, respectively. Entries are school districts where the experiments were held. Conversion factor of 0.08 standard deviations=1 month of schooling.

OTHER INCENTIVE PROGRAMS

An individual-based teacher incentive program elsewhere in the United States similarly found no impact on student achievement. Springer and colleagues (2010) evaluated teacher incentives in Nashville. Middle school math teachers were awarded $5,000, $10,000, and $15,000 bonuses if their students performed at the 80th, 90th, and 95th percentiles, respectively, in the historical distribution of class performance. Springer and colleagues found no significant effects on student achievement or teaching practices.

There are a couple of nonexperimental evaluations of teacher incentive programs in the United States, both of which report nonsignificant impacts on student achievement (Glazerman, McKie, and Carey 2009; Vigdor 2008). The Teacher Advancement Program (TAP) in Chicago rewarded teachers based on classroom observations (50 percent) and schoolwide student growth on Illinois state exams (50 percent). Evaluations of TAP in its first two years find no impact on student achievement, but further time is needed to determine the program's effect, especially because the structure of the program is still changing and teachers can adapt to new incentives (Glazerman and Seifullah 2010).[9]

Other schools also have implemented performance pay programs for teachers, but there is little rigorous evidence on their effectiveness. Most school districts that have implemented performance pay for teachers use similar metrics to those used in New York City to measure teacher's performance. For example, Houston's ASPIRE program uses measures of the impact of both schools and individual teachers on student test score growth in state exams to reward the top 50 percent of teachers, with the top 25 percent receiving an extra bonus. Alaska's Public School Performance Incentive Program divides schoolwide student achievement into six categories and rewards teachers based on the average movement up to higher categories. Florida's STAR uses a similar approach, but at a teacher level instead of a school level. Virginia is piloting a program with individual incentives for teachers at hard-to-staff schools.

Other experimental evaluations come from other countries. Duflo and Hanna (2005) provided schools in rural India with incentives to reduce absenteeism and found positive effects on teacher attendance and student achievement. In India, Glewwe Ilias, and Kremer (2010) found that group incentives for teachers based on test scores increased test scores in the short run, but that students did not retain the gains after the program ended. Finally, Muralidharan and Sundararaman (forthcoming) investigate the effect of individual and group incentives in India, finding increases in student achievement from both types of incentives, although individual incentives were more successful in the second year.

The effectiveness of teacher incentives can vary a good deal depending on the context; more research is needed on incentive design and effectiveness. One common feature of incentive programs tested is that they compare teachers' or schools' performance to the distribution of performance in the district. In this system, teachers may feel that their measured performance is not entirely in their control because it also depends on how well teachers at other schools are doing (since teachers are compared to other teachers). Additionally, the incentives experimented with in New York City were awarded based on overall school performance. Because schools then chose to distribute the incentives more or less equally internally, teachers were not awarded based on their individual effort. This ambiguity—the likelihood of receiving an incentive depends on one's own effort and the effort of others—may make increased effort seem less worthwhile. Another possibility is that these programs simply have not been in place for long enough for teachers to properly react and adapt their teaching habits.

The effectiveness of teacher incentives can vary a good deal depending on the context…

Chapter 4: The 10 Do's and Don'ts of Education Incentives

This section expatiates "10 Do's and Don'ts" of education incentive programs based on our set of incentive experiments for students and teachers and the literature from elsewhere in the United States and around the world.

1. DO PROVIDE INCENTIVES FOR INPUTS, NOT OUTPUTS, ESPECIALLY FOR YOUNGER CHILDREN.

Economic theory predicts that incentives based on outputs or achievements, such as test scores or grades, will work better than incentives based on inputs, such as a required time for reading and homework. The theory would suggest that not all students learn the same, and they individually know what works best for them with regard to activities such as time spent doing homework, reading books, and listening in class to achieve the best outcome. Incentives for inputs are basically rewards for specific behaviors that may lead students to focus on that input (i.e., reading or better behavior) even if it is not the input that will most help them achieve higher grades. Incentives for the desired output or achievement would instead empower each student to decide how to improve his output. As any parent knows, however, this simple set of assumptions does not always hold true; therefore, in some cases, it can be more effective to provide incentives for inputs. In the end, this is the result that our research supported.

In our experiments, input incentives were more effective than output incentives, suggesting that students do not know how to increase their test scores. If students only have a vague idea of how to increase their test scores, then when provided with incentives for performance, they may not be motivated to increase effort. In Dallas, Houston, and Washington, DC, students were not required to know how to increase their test scores: they only needed to know how to read books on their grade level, master math objectives, attend class, behave well, wear their uniforms, and so on. In other words, they were rewarded for inputs. In New York City, students were required either to know how to improve test scores or to know someone who could help them with the task. In Chicago, students faced a similar challenge—they were required to undertake the necessary steps to improve their performance.

In addition to our quantifiable findings, there is also qualitative data supporting the theory that students do not respond well to the general challenge of improving their performance, or output. During the 2008–2009 school year, seven full-time qualitative researchers in New York City observed twelve students and their families, as well as ten classrooms. From detailed interview notes, the researchers gathered that students were uniformly excited about the incentives and the prospect of earning money for school performance. In a particularly illuminating example, one of the treatment schools asked their students to propose a new "law" for the school, a pedagogical tool to teach students how bills make their way through Congress. The law that students chose to study, by a nearly unanimous vote, was a proposal that students take incentive tests every day.

Despite showing that students were excited about the incentive programs, the qualitative data also demonstrate that students had little idea about how to translate their enthusiasm into tangible steps designed to increase their achievement. After each of the ten exams administered in New York City, our qualitative team asked students how they felt about the rewards and what they could do to earn more money on the next test. Every student found the question about how to increase his or her scores difficult to answer. Students answering this question discussed test-taking strategies rather than salient inputs into the education production function or improving their general understanding of a subject area. For instance, many of the students expressed the importance of "reading the test questions more carefully," "not racing to see who could finish first," or "re-reading their answers to make sure they had entered them correctly." Not a single student mentioned reading the textbook, studying harder, completing homework, or asking teachers or other adults for help with confusing topics.

Two focus groups in Chicago confirmed the more systematically collected qualitative data from New York City. The focus groups included a total of thirteen students, evenly split (subject to rounding) between blacks and Latinos, males and females. Again, students reported excitement about receiving financial incentives for their grades. Students also reported that they attended school more, turned in more homework, and listened more in class. Yet when probed about

why other inputs to the educational production function were not used—reading books, staying after school to work on more problems, asking teachers for help when they were confused, reviewing homework before tests, or doing practice problems presented in textbooks—one female student remarked, "I never thought about it." The basic themes from students in Chicago centered on the excitement generated by the program at the beginning of the year. This excitement triggered more effort initially—coming to school, paying attention in class, and so on. Students indicated that they did not notice any change in their performance on quizzes or tests, however, so they eventually stopped trying. As one student put it, "Classes were still hard after I tried doing my homework."

A similar argument may partially explain the ineffectiveness of the teacher incentives tested. It is plausible that teachers do not know how to increase student achievement without proper coaching and development. If true, teachers face the same challenges as students in responding to the general challenge of improving student performance, or output. Rather, future teacher incentive programs may try to link additional compensation to activities, behaviors, or training that policymakers believe are correlated with student performance.

2. DO THINK CAREFULLY ABOUT WHAT TO INCENTIVIZE.

Ideally, providing incentives for a particular activity would have spillover effects on many other activities. For instance, paying students to read books might make them equally excited about math. Or paying students for attendance and behavior—as we did in Washington, DC—might increase enthusiasm for school so much that students engage in new ways with their teachers. From our set of experiments, these effects did seem to take place. Incentives seem to change what people do, and not who they are. Unfortunately, since the standard errors are so large in our DC experiment, it is unclear whether this principle holds there, because we cannot rule out modest-sized effects in either direction.

Across our set of experiments, we collected self-reported measures of effort and investigated achievement on dimensions in which we did not provide incentives. In every experiment the data were clear: students did precisely what they were paid to do, and not any more. Indeed, our team of qualitative researchers reported general excitement by students about earning rewards, but the students seem to have focused their behavioral changes on precisely those elements that were incentivized.

Thus, one has to think very carefully about what to provide incentives for and target those incentives to achievement-enhancing activities. For instance, it is plausible that some of the inputs for which we provided incentives—behavior, attendance, turning in homework regardless of the quality—are not well suited to achievement gains. As discussed above, we cannot rule out the possibility that the experiment produced modest gains on these dimensions. But, due to imprecision, the achievement effects of this experiment are only marginally significant.

3. DO ALIGN INCENTIVES.

Among the incentive programs tried, the one that has shown the most power on direct outcomes is our experiment in Houston that aligned the incentives of teachers, students, and parents. Recall that treatment students mastered 125 percent (or 0.985 standard deviations) more objectives than control students. Furthermore, according to student and parent surveys, parents of students in treatment attended 87 percent (or 0.829 standard deviations) more teacher conferences than parents of control students.

Since teachers, students, and parents can all play a role in learning, incentives may be more effective when they are all nudged toward the same goal. There may be important factors outside of a student's or teacher's control that affect performance. For instance, student incentives may need to be coupled with good teachers, an engaging curriculum, effective parents, or other inputs in order to produce output. In Dallas, students were encouraged to read books independently and at their own pace. In Washington, DC, we provided incentives for several inputs, many of which may be complementary. It is plausible that increased student effort, parental support and guidance, and high-quality schools would have been necessary and sufficient conditions for test scores to increase during our Chicago or New York City experiments. An anecdote from our qualitative interviews illustrates the potential power of parental involvement and expectations coupled with student incentives to drive achievement. Our interviewers followed a high-performing Chinese immigrant student home when she told an illiterate grandmother that she had earned $30 for her performance at school. Her grandmother immediately retorted, "But Jimmy next door won more than you!"

4. DON'T THINK THE EFFECTS GO AWAY IMMEDIATELY AFTER THE INCENTIVES ARE REMOVED.

A central question in the study of incentives is what happens when the incentives are taken away. Many believe that students will have decreased intrinsic motivation and that their achievement will be negative once the incentives are discontinued. (See Kohn 1993 and references therein.)

Contrary to this view, the point estimate one year after the Dallas experiment is roughly half of the original effect in reading and larger in math. The finding for reading is similar to the classic "fade-out" effect that has been documented in other successful interventions, such as Head Start, a high-quality teacher for one year, or a reduced class size (Nye, Hedges, and Konstantopoulos 1999; Puma, Bell, Cook, and Heid 2010).

Furthermore, fading of test score gains does not necessarily mean that there are no positive long-term outcomes. One study that links kindergarten test scores with adult wages finds that even when test score gains disappear in later grades, the effects appear again in earnings as an adult (Chetty, Friedman, Hilger, Saez, Schanzenbach, and Yagan 2011). In the experiment, kindergarteners were randomly assigned to different classrooms. Some of these classrooms had better teachers or meshed together better. Chetty and colleagues identified kindergarteners who received a boost in their test scores from being randomly assigned to better classrooms. These students did not score significantly better on tests in later grades, but earned more as adults. One possible explanation is that good kindergarten classes teach other skills, such as patience and work ethics, that may not influence test scores later on, but do influence income.

5. DON'T BELIEVE THAT ALL EDUCATION INCENTIVES DESTROY INTRINSIC MOTIVATION.

One of the major criticisms of the use of incentives to boost student achievement is that the incentives may destroy a student's "love of learning." In other words, providing external (extrinsic) rewards can crowd out a student's internal (intrinsic) motivation. There is an active debate in psychology as to whether extrinsic rewards crowd out intrinsic motivation.[11]

In a review of the literature surrounding the detrimental effects of extrinsic rewards on intrinsic motivation, Eisenberger and Cameron (1996) conclude that although there can be negative effects on intrinsic motivation from certain uses of extrinsic reward structures, these circumstances are restricted and do not eliminate the use of extrinsic rewards altogether. Eisenberger and Cameron claim, however, that there are many uses of incentives that do not diminish student motivation.[12]

To test the impact of our incentive experiments on intrinsic motivation, we administered the Intrinsic Motivation Inventory, developed by Ryan (1982), to students in our experimental groups. The inventory has been used in several experiments related to intrinsic motivation and self-regulation (e.g., Deci, Eghrari, Patrick, and Leone 1994; Ryan, Koestner, and Deci 1991). The instrument assesses participants' interest/enjoyment, perceived competence, effort, value/usefulness, pressure and tension, and perceived choice while performing a given activity. There is a subscale score for each of those six categories. We include only the interest/enjoyment subscale in our surveys because it is considered the self-report measure of intrinsic motivation. The interest/enjoyment instrument consists of seven statements on the survey: (1) I enjoyed doing this activity very much. (2) This activity was fun to do. (3) I thought this was a boring activity. (4) This activity did not hold my attention at all. (5) I would describe this activity as very interesting. (6) I thought this activity was quite enjoyable. (7) While I was doing this activity, I was thinking about how much I enjoyed it. Respondents are asked how much they agree with each of the above statements on a seven-point Likert scale ranging from "not at all true" to "very true." To get an overall intrinsic motivation score, we added the values for these statements (reversing the sign on Statements [3] and [4]). Only students with valid responses to all statements are included in our analysis of the overall score, as nonresponse may be confused with low intrinsic motivation.

Table 4 reports the impact of our set of experiments on the intrinsic motivation of students in each city. Contrary to Deci (1972), Kohn (1993), and others, these results show that our incentive programs had little to no effect on intrinsic motivation. This suggests that the hyperconcern of some educators and social psychologists that financial incentives destroy a student's intrinsic motivation may be unwarranted in this context.

> Incentives seem to change what people do, and not who they are.... In every experiment the data were clear: students did precisely what they were paid to do, and not any more.

TABLE 4

Average Effects of Student Incentive Programs On Intrinsic Motivation

	Dallas	Washington DC	Houston	NYC 7th	Chicago
Intrinsic Motivation Inventory	-0.020	0.067	-0.003	-0.048	0.017
	(0.068)	(0.052)	(0.055)	(0.049)	(0.065)

Notes: Each column label describes the district where the experiment took place. This table reports intent-to-treat estimates of the effect of being offered a chance to participate in treatment on the outcome listed in column one. All dependent variables are normalized to be mean zero, standard deviation 1, and all point estimates are in standard deviations from the normalized mean. Regressions control for demographic factors and previous test scores and include all members of the experimental group with non-missing survey data. Results marked with *, **, and *** are significant at the 10%, 5%, and 1 percent levels, respectively. See Fryer (forthcoming) for further details.

TABLE 5

Average Effects of Student Incentive Programs On Spending Habits

	Entertainment	Clothing	Food	Household Bills	Saved more than $50?
Washington DC	-9.956**	-25.844***	-12.840***	-6.961**	0.276***
	(3.852)	(6.810)	(3.061)	(2.814)	(0.070)
Houston	-14.571***	-6.759	-2.553	-0.033	0.454***
	(3.478)	(5.725)	(2.051)	(1.263)	(0.079)

Notes: Each column label describes a category of expenditure where students reported spending their money. The first four columns report intent-to-treat estimates (in $) of the effect of being offered a chance to participate in treatment on the amount of money an individual spends on each category. The final column, labeled "Savings" reports coefficient on treatment from a probit regression on a binary variable of whether or not a student has $50 or more in savings. Regressions control for demographic factors and previous test scores and include all members of the experimental group with non-missing survey data. Results marked with *, **, and *** are significant at the 10%, 5%, and 1 percent levels, respectively. Entries are school districts where the experiments were held. Observations where students reported spending more than $300 on any single component of a given category were set to missing.

6. DON'T WORRY THAT STUDENTS WASTE THE MONEY THEY EARN.

The spending habits of our subjects was a common query, and in response we asked detailed questions in every experiment about what students spent their money on, how much was saved, and how much their parents took away from them. The results were enlightening, and are summarized in Table 5.[13]

Our incentives experiments produced a large effect on students' saving habits: in Washington, DC, treatment students were 27.8 percent more likely than control students to have saved over $50, while in Houston, treatment students were 45.4 percent more likely to have saved over $50. Both estimates are significant at the 1 percent level. On the other hand, in Washington, DC, paying students produced significant negative effects on student spending on entertainment (–$9.96 per month), clothing (–$25.84 per month), food (–$12.84 per month), and even household bills (–$6.96 per month). Likewise, in Houston point estimates revealed large negative effects: –$14.57, –$6.76, –$2.55, and –$0.03, respectively. All DC results were significant below the 5 percent level, while in Houston, only the decrease in spending on entertainment was statistically significant, albeit at the 1 percent level.

These findings demonstrate that apprehension over paying students for fear that they will spend their earnings quickly is misguided. Students in our programs showed a strong proclivity not only to spend less than nonearning peers, but also to save more. Each of our experiments involved educating students on financial literacy and helping students establish bank accounts. A well-designed incentive program can incorporate financial literacy education that promotes savings behaviors and a sense of personal responsibility. Recall that MDRC's Opportunity NYC conditional cash transfer

program successfully decreased reliance on alternative banking institutions and increased savings by providing cash incentives to parents and students. More research is needed, but preliminary results suggest that implementing these kinds of programs early on for our youth may help promote a culture of savings and help students develop a higher level of fluency and comfort within the context of traditional financial institutions.

To be sure, the exact spending habits of recipients of rewards in education incentive programs may not be important at all if the incentives themselves have a positive impact on student achievement. Of course, understanding that students (perhaps unexpectedly) save a large portion of their rewards might make the idea of an incentive program more palatable to districts and schools. But student achievement is the most important outcome, and if incentive programs improve achievement and students spend their earnings on video games and junk food, from our perspective, that is a desirable set of outcomes.

7. DO IMPLEMENT WHAT WORKS.

Implement what has been shown to work, not what tickles your intuition, and do not generalize the results too broadly. After we finished the first round of our incentives work, we briefed a top-ranking policy official in Washington, DC. After hearing that paying students $2 per book read yielded statistically significant effects on reading comprehension scores, his response was, "Excellent. Based on these results I want to implement a policy that rewards kids with nonfinancial incentives for doing their homework." But our results showed that paying students for doing general homework was not an effective way to increase achievement, and nonfinancial incentives may not have the same effect as financial incentives.

The results discussed here are from demonstration projects on financial incentives across the United States. We are confident that the impacts of these particular programs are accurately estimated. We are less confident that the same program implemented in a different city will give similar answers. And, perhaps more importantly, we have absolutely no confidence that a program with multiple variations in any city will have similar results.

Also, we need to be careful about extrapolating results from other countries. Incentives given to students and teachers in other countries are given in a different context from those given in the United States. In Mexico, incentives were shown to have a large positive impact on student attendance and growth and development outcomes, such as child health and early childhood cognitive development. In the United States, though, we have not seen any such increases with similar incentives. Indeed, the New York City Department of Health and Human Services designed "Opportunity NYC" in partnership with MDRC to closely mirror the PROGRESA (Programa de Educación, Salud y Alimentación) experiment in Mexico by providing cash incentives to parents (and sometimes students) for a range of behaviors and outcomes including school attendance, student achievement, preventive healthcare participation, and human capital development. The evaluation of Opportunity NYC showed promise for reducing some of the immediate hardships linked to poverty by mitigating hunger, increasing healthcare participation, and decreasing reliance on alternative banking institutions, but the program demonstrated no impacts on academic dimensions, including all academic outcomes for elementary school, middle school, and lower-achieving high school students. However, among well-prepared high school students, Opportunity NYC appears to have modest positive effects on attendance, course grades, credits earned, and standardized test achievement (MDRC 2010).

It is possible that one of the reasons that incentive schemes such as PROGRESA were effective in Mexico but not New York City is that the social safety net in America is very different from the safety net in Mexico. In other words, the incentives in programs such as Opportunity NYC provide marginal incentives above and beyond what individuals already have. If there are differences across places in the level of baseline incentives, the effect of an additional incentive program can vary dramatically.

8. DO STAY THE COURSE.

Few educational policies provoke as strong a negative visceral reaction among the general public as tying financial incentives to learning. In a 2010 PDK/Gallup poll, only 23 percent of Americans said they supported "the idea of school districts paying small amounts of money to students to, for example, read books, attend school or get good grades." Seventy-six percent opposed the idea, with 1 percent undecided. As points of contrast, consider the results from another recent public opinion poll. In 2008, an ABCNEWS poll found that 26 percent of Americans say grade-school teachers should be allowed to spank kids at school, with even higher approval rates in the South (35 percent) and the Midwest (31 percent). In other words, the concept of paying students in school is less palatable than the concept of spanking students in school.

Despite the public's negative opinion of financial incentives for students, reform-minded school leaders are increasingly interested because they recognize that conventional wisdom is simply not producing results (see Figure 2). While the initial phases of implementation can lead to negative publicity and pushback from within the community, what ultimately matters

is student achievement; the challenge for policy-makers is to educate their constituents about the results. Results change minds, and the body of evidence suggests that a properly implemented incentive program can be a cost-effective means of improving student learning outcomes.

In a similar poll by USA TODAY in 2008, more than half of the seventy-four CEOs and other senior executives that were surveyed supported financial incentives in schools, and exactly half reported instituting similar ideas for their own children. While this sample is small and still divided, it suggests that those individuals who have perhaps the most experience with the power of financial incentives in the marketplace—businesspersons whose profits are driven by recruiting, retaining, and motivating their workers to perform at their peak—are far more likely than the general public to support similar incentives in schools.

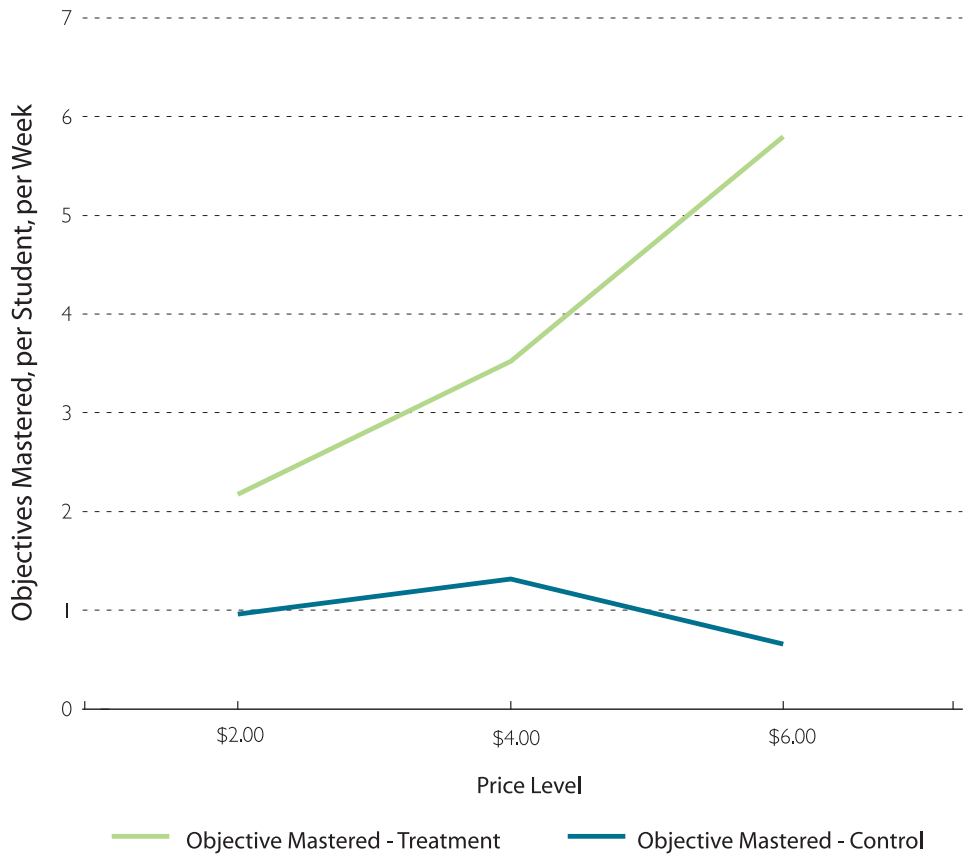
9. DON'T BE CHEAP.

Deciding the appropriate price to pay students for different behaviors or levels of achievement can be difficult; given fiscal constraints, policy-makers and educators may worry about spending extra money that will not produce results. Our research found, however, that when incentives work, increasing the amount of the incentive also brings about a larger impact. Students respond to the incentives, and when we unexpectedly increase the price, students put in even more effort.

Figure 5 demonstrates this fact from our incentive experiment in Houston. Students in treatment were paid $2 per math objective mastered. (Students in control were not paid for mastering objectives.) Under this incentive format, students mastered roughly two objectives per week. In mid-February, we unexpectedly increased the price to $4 per objective for four weeks. During the following four weeks, the average

FIGURE 5

Math Stars Houston, Objectives Mastered by Price Level



Source: Data from the authors.

number of objectives mastered per week increased to more than three and a half in the treatment group and stayed constant in the control group (where students were not being paid for mastering objectives). After this bonus period was over, students again were paid $2 per objective mastered. Two months later, we again announced a price increase—this time to $6 per objective mastered. Figure 5 shows that students responded by mastering almost six objectives per week.

Using these three data points, a simple calculation shows that for every 10 percent increase in payments, students increase their effort by 8.7 percent. Compared to traditional measures of labor supply elasticities of adult males—which average about 0.32 (Chetty 2011)—this elasticity of 0.87 is relatively high, meaning that students in our incentive program are highly price sensitive and will likely respond to increased incentives.

10. DON'T BELIEVE THE HYPE: INCENTIVES ARE NOT A PANACEA.

Incentives can have a large return on investment, but they will not eliminate the educational problems of the United States or eliminate the racial achievement gap. That is, they are a wise investment in a diverse portfolio of reforms, but not a cure-all. Effect sizes from incentive programs in America range from statistically zero (or even negative) to 0.256 standard deviations, or about three months of additional schooling. Relative to the education "crisis" described in the introduction, these are modest effects. For instance, black and Latino students are typically 1.0 standard deviation behind whites on standardized tests. Thus, even under the most optimistic assumptions, and even if we provided incentives only to minority students, they would decrease the gap by one fourth. Again, the gain from incentive programs is not large relative to the gap, but is large relative to its cost. The ideal of students internalizing the incentive structure and then demanding more (and better) education from their teachers and parents is not consistent with the data.

Similarly, the hope that providing struggling teachers with incentives will miraculously increase their effort, make them better teachers, and increase student achievement is not consistent with the experimental evidence to date. Teacher incentive experiments in Tennessee provided incentives that were roughly 22 percent of their annual salary. Still, the program yielded no long-term effects.

Incentives are a wise investment in a diverse portfolio of reforms, but not a cure-all.

Chapter 5: Moving Forward on Evaluating Education Incentives

The set of experiments discussed here has generated three broad lessons: (1) that incentives for certain inputs such as reading and doing math homework will raise student achievement, (2) that incentives for output seem less effective, and (3) that group-level incentives for teachers do not appear to be effective. Much more remains to be done and some areas for research are discussed below:

PROVIDE INCENTIVES FOR STUDENTS OR TEACHERS TO TRY NEW STRATEGIES.

Incentive programs provide the opportunity to experiment with new approaches to learning and to find out which student behaviors and teaching strategies actually work. Testing out incentives for innovative inputs is essential for designing effective programs, and can also provides broader insight into what works in the learning process. For example, teachers could be given incentives for using technology in the classroom, or students could be asked to watch educational videos at home.

TRY VARYING THE INCENTIVES.

Incentives can vary in amount or type (financial or nonfinancial). Every community is different and we encourage education leaders to try new and different ideas to test what works best in their schools. Changing the amount and type of incentive can help determine the combinations with the highest returns, and variation during the program itself helps keep students engaged and motivated. During the Houston experiment, for example, the reward for passing math quizzes was increased during certain weeks. Interestingly, student mastery per day rose dramatically when rewards increased, but student participation (i.e., the percentage of eligible students who mastered at least one objective and thereby received rewards) did not increase. The higher reward amount did not encourage more students to participate, but it made students already participating more eager to complete the quizzes.

TRY NONFINANCIAL INCENTIVES, ESPECIALLY FOR TEACHERS.

Mobile phone minutes and other nonfinancial incentives can save money for incentive programs by cutting down on distribution costs. Nonfinancial incentives may be more cost-effective if students or teachers put a higher value on them than their cost. For example, popcorn and pizza parties are relatively low cost, but students enjoy them because they provide opportunities to celebrate. Similarly, gift cards that can be purchased in bulk at a discounted price might also have excess value because they cut down on transaction costs and render rewards nontransferable to other family members. Teachers may not respond well to financial incentives, but they may be enticed by benefits such as vacation time or changes to the work environment. In Canada, teachers are allowed to defer a portion of their salary each year to self-fund a leave of absence. The popularity of this program shows that teachers may prefer nonmonetary rewards to additional pay (Jacobson and Kennedy 1997).

DO MORE WITH PARENTS.

Parent incentives were tested only as a part of the package of incentives for teachers, parents, and students in Houston; results showed that parents with incentives were significantly more invested than were other parents. Future programs could incentivize only parents or they could provide incentives for more specific behaviors outside of going to conferences, such as enforcing a homework time for their children or encouraging them to read for a given amount of time. Parent incentive programs have potential to improve student achievement, but we need to experiment with them further.

Chapter 6: Structuring and Implementing Incentive Programs

This section discusses how to structure and implement an incentive program. The guidelines provided are based on the actual implementation of incentive programs designed and evaluated by EdLabs at Harvard in partnership with school districts. An online appendix provides a full description of how these programs were designed and implemented including approaches taken in different project sites (please visit www.hamiltonproject.org for this online appendix). This implementation guide draws lessons from those experiences, but is written with the idea that districts and schools can design and execute incentive programs on their own. As long as schools are implementing incentive programs that have been proven successful, then there may not be a role for an implementation and evaluation partnership.

CONSTRUCTING AN INCENTIVES STRUCTURE

The structure of an incentive program can and will vary from district to district and from school to school; each district or school can pick and choose which tasks and behaviors to provide incentives for, the amount of incentives to be paid, and payment structure. If a particular district struggles with reading scores or a particular school suffers from low attendance rates, the opportunity for a tailored yet properly implemented incentive program could be especially fruitful.

Our prescription for constructing a workable incentives structure follows from our two central claims about incentive programs: First, unlike other major education initiatives of the past few decades, a large proportion (approximately 70–80 percent) of expenditures should be directed to students, parents, or teachers in the form of incentives payments.

Past education initiatives—from reducing school and classroom sizes and providing mandatory after-school programs, to providing renovated and more technologically savvy classrooms and professional development for teachers and other key staff—spend a far higher percentage of total expenditures on indirect costs such as building renovation, training, and computers than our incentive programs.

In incentive programs, most funds should go directly to students, teachers, or parents. The proportion of expenditures devoted to administration should be small but will vary depending in part on the scale of the incentive program. Consider a districtwide incentive program in which students earn money for doing homework and are able to gain a maximum of $100 during the school year. Two thousand students from twenty schools participate, and the average student receives $50 total. Students are paid by check every three weeks, ten times total. Incentives payments for the year would total approximately $100,000. In this hypothetical example, the most significant marginal costs for an internally driven incentive program are a full-time program manager and covering payment-processing fees. The program manager would be responsible for all payment calculation, auditing, and reward distribution. Where payments could be tied to the employee payroll cycle, the cost of payment processing may be minimized; where a bank partnership is necessary to process

Unlike other major education initiatives of the past few decades, a large proportion (approximately 70-80 percent) of expenditures for incentive programs should be directed to students, parents, or teachers...

and print checks, the cost will be similar to contracting with an external payroll vendor (usually a per check or per deposit rate between $0.30 and $0.50).

Now consider a single school incentive program in which students can earn up to $180 for wearing their uniform to school every day. Five hundred students participate and the average student receives $120 during the school year. Students are paid in cash at the end of every month by their assistant principal, using Title I funds. Although the incentives payments total is $60,000, in this instance there is no need for a dedicated program manager and no cost associated with processing the payments.

The second claim underlying our guidelines for implementing incentive programs is that the incentive programs described herein are eminently scalable within school districts or even individual schools. This claim is based on our reliance on district-based teams to help manage the day-to-day operations in our own experiments and ensure fidelity of implementation. At a district level, program implementation would be driven entirely within a district department, with incentive payments offered either along the employee payroll cycle or through a third-party payroll vendor (see Payment Calculation and Distribution, below). Following our five guidelines can lead to successful in-district implementation.

IMPLEMENTING INCENTIVE PROGRAMS

The implementation of an incentive program must be a coordinated effort to ensure that students, parents, teachers, and key school staff understand the particulars of each program; that schools are constantly monitoring the performance of students; and that payments are distributed on time and accurately. Five guidelines are key to realizing these objectives:

1. Students and their families are provided with extensive information about the programs, with additional mechanisms to check understanding.

2. Explicit structures of communication and responsibility are created between districts and third-party vendors, including procedures to govern the flow of data, information, and reporting.

3. A payment algorithm is created to generate reward amounts from student performance data, and procedures are established to both run the algorithm on a predetermined schedule and to distribute rewards.

4. Regular reporting is done on subject (student or parent) performance, including metrics such as participation, average earnings, and refined budget projections.

5. A culture of success is built by recognizing student performance with assemblies, certificates, and bonuses.

A general summary of each guideline is included below. Additional details, based on our research, can be found in the online appendix. These examples are based on our work through EdLabs and should be replicable, whether a school district works independently or with another outside implementation and evaluation partner.

1. Informing Subjects. One of the truly distinguishing features of our incentives experiments is the concentrated effort made to fully inform students and their families not only of the particulars of each program (i.e., incentive scheme, reward schedule, etc.), but also the potential risks involved in participating.[14] Students and families can be briefed in a number of different ways, but we recommend the following route to ensure all subjects are informed.

During the time leading up to and including the first weeks of school, community forums should be held to inform parents of the details of the incentive program. Additionally, having district officials on hand at Back to School Night can be valuable to answer any questions from parents.

Once the school year begins, eligible students should be given an information packet to take home to their families. These packets can include any number of documents, but typically include a letter from the superintendent with basic program details, a parental consent or withdrawal form, a list of frequently asked questions about the program, an overview of the incentive scheme, and a program calendar with details about reward distribution. Parents should return consent or withdrawal forms to the school so the school can determine a final list of participants. Once program rosters are solidified, the school should provide participating students with a second welcome packet to reinforce program basics and should provide students with additional copies of program calendars.

After the first six to eight weeks of each program, we recommend that a brief quiz be administered to students during the school day to gauge understanding of the basic elements of the program: incentive structure, reward calendar, to whom to direct questions, and so on. Answers should be compiled and analyzed as quickly as possible to determine possible areas of confusion. If areas of confusion are identified, a presentation should be developed and delivered to groups of students before then re-administering the quiz.

The importance of ensuring subject understanding of an incentive program through digestible materials and persistent

assessment of subject knowledge cannot be overstated. Simply put, estimates of treatment effects are meaningless if subjects do not fully comprehend the study in which they are participants; it is as if the subjects did not participate at all, and that is precisely why informing subjects is a foundational piece of proper implementation.

2. Structures of Communication and Responsibility. The second major guideline of successfully implementing an education incentive program requires building district capacity by hiring and empowering a district-based program management team. This team would serve as the primary liaison with both schools and other partners, where relevant. Responsibilities would include maintaining fidelity to the original design by ensuring that students, parents, teachers, and key school staff understood the particulars of each program; ensuring that programmatic data were reported to vital district stakeholders and used to drive instruction; correctly calculating rewards and distributing payments on time and accurately; and (where relevant) ensuring that external partners performed their duties and provided timely assistance.

Given the temporary nature of their employment, district program teams should report frequently to permanent members of a district's structure. In our experience, these teams were often subsumed under and reported directly to district leadership (such as the superintendent/chancellor/CEO, chief academic officer, or even ad hoc "innovation" departments). Their exact location is never important as

FIGURE 6

Personnel Structure

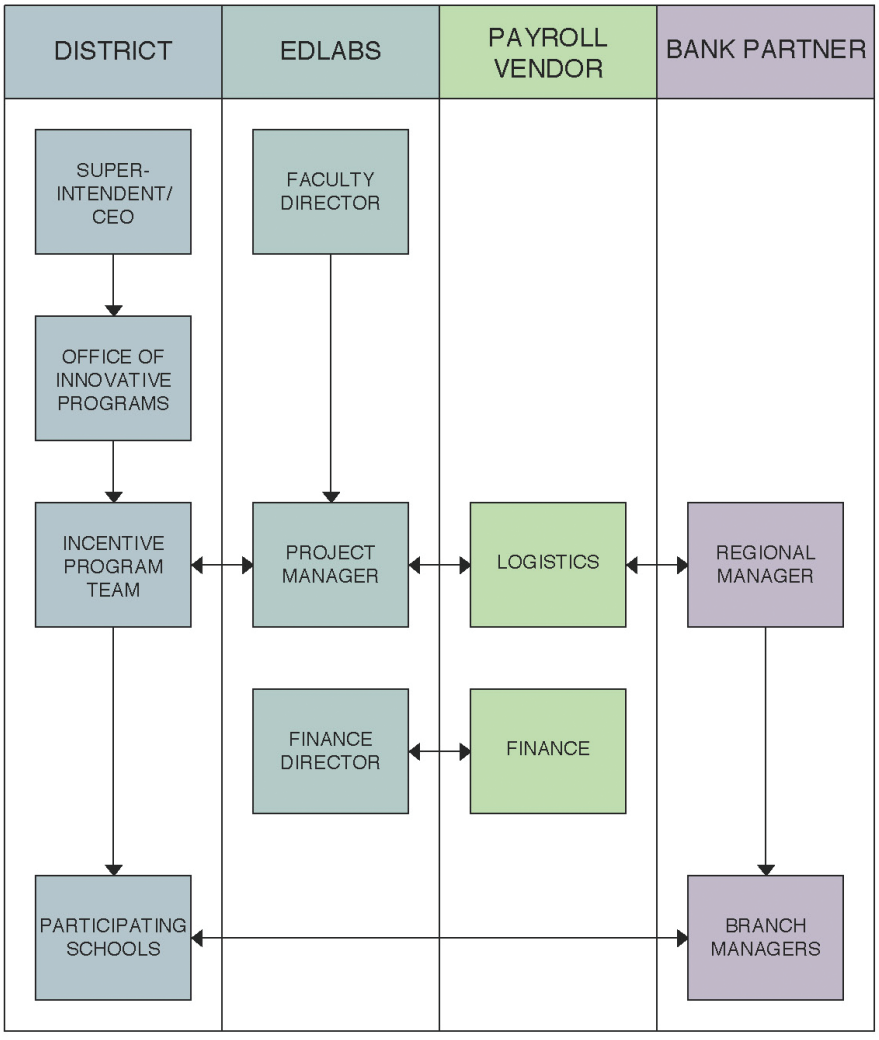
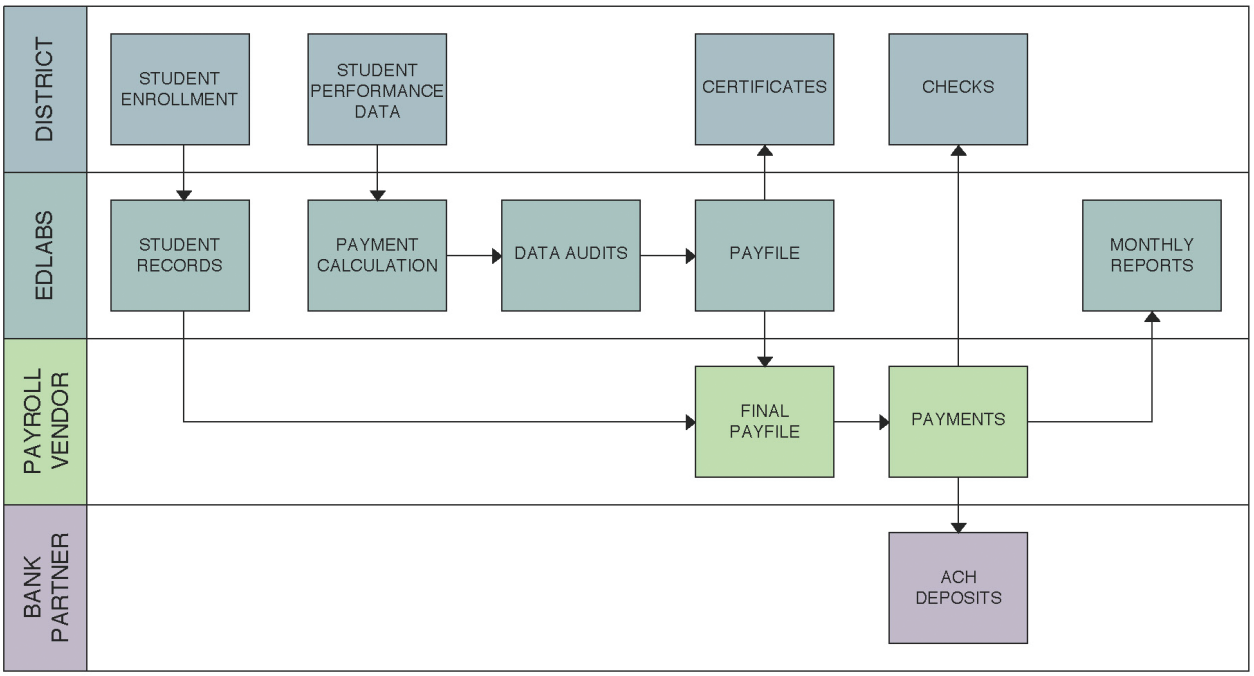


FIGURE 7

Incentive Payment Calculation and Distribution Process



long as program teams are given the flexibility to work with dozens of schools and maintain close contact with third-party vendors. Figure 6 provides an example of the personnel structure used by EdLabs in partnering with school districts that lays out the duties of each party and could serve as a schematic for internally driven programs.

3. Payment Calculation and Distribution. Payment protocol will vary from district to district or from school to school. District program managers should be responsible for rendering student performance data into reward amounts and performing subsequent audits.

From there, structure can vary. Districts may choose to use a third-party payroll vendor who can process payments and either initiate a direct deposit, or print and ship a check. Checks then could be audited and distributed to school-based coordinators and, eventually, to students.

Alternatively, schools could process payments through their current payroll system—after calculating payments, the district could process the checks through its payroll system. Checks could be distributed on paydays.

Figure 7 diagrams the flow of the payment calculation and distribution procedures as executed by EdLabs in partnership with a diverse set of districts. Again, the separation of duties could inform how to arrange a district-driven program.

4. Data Reporting and Monitoring. Careful and regular reporting is another critical component of running an incentive program, as the amount of programmatic performance data generated provides a unique opportunity to monitor student progress and to use data to drive instruction outside the program.

Depending on the incentives structure developed, data will be collected and analyzed through different avenues. In any event, principals, educators, and program coordinators should be constantly monitoring and reporting on students' progress. Examples of different data formats and gathering strategies can be found in the online appendix.

Incorporating program data into larger school-level contexts can both supplement strategic intervention plans and mitigate any perceived burdens of implementation. Simply put, the students who are struggling according to the incentive program data are more than likely struggling "outside" the program as well. The regular use of program data and implementation monitoring can help teachers and school leaders identify not

only individual students, but also schoolwide trends. If, for example, a school that rewards students for attendance creates a summary dashboard that indicates their school has fallen behind the program average of attendance earnings, they can design a supplemental reward, or tinker with the reward amount, or even introduce a schoolwide initiative to improve attendance. In sum, designing customized data reporting tools and using preexisting tools are critical techniques for monitoring fidelity of implementation (or adjusting the research design), addressing challenges or shortcomings on an ongoing basis, projecting program costs, and targeting students, classrooms, and schools for specific interventions.

5. Building a Culture of Success. The final critical component of running a successful incentive program is building and maintaining an underlying culture of success and recognition for student performance. To do so, we recommend that schools, in concert with teachers, principals, and district leadership, use certificates and reward assemblies as the primary forms of student support and encouragement.

Certificates including program insignia, pay period dates, and details of student earnings are the primary vehicles for reporting student performance to students. Certificates can be created after each pay period and distributed to school-based coordinators. Students can receive certificates along with their checks; for students that received payment via direct deposit, certificates can function as a paystub. Students who do not receive rewards for a given pay period can be given modified certificates or encouraging letters as a way of motivating them towards future rewards.

Assemblies are another important way of distinguishing incentive programs within campuses and recognizing student achievement. Two types of assemblies can be held: at the start of the school years, schools can hold assemblies or pep rallies to introduce and generate excitement about the program, as well as answer questions and provide basic program details. Throughout the school year on paydays, additional assemblies can be held, at which participating students could publicly receive their check or certificate, or both.

In sum, our experience has showcased the power and importance of supplementing incentives with other forms of recognition for two principal reasons: first, certificates and assemblies reinforce student work and serve as a regular reminder to students of their role and status within the program (and their school generally); and second, the very public distribution of reward amounts and certificates creates an atmosphere of transparency among peers and might contribute productively to increased competition in terms of rewards and, as an extension, achievement generally.

The final critical component of running a successful incentive program is building and maintaining an underlying culture of success and recognition for student performance.

Conclusion

In an effort to increase achievement and narrow differences between racial groups, school districts have attempted reforms that include smaller schools and classrooms, lowering the barriers to entry into the teaching profession through alternative certification programs, and so on. One potentially cost-effective strategy, not yet fully tested in American urban public schools, is providing short-term financial incentives for students to achieve or exhibit certain behaviors correlated with student achievement.

This paper reports estimates from incentive experiments in public schools in Chicago, Dallas, Houston, New York City, and Washington DC—five prototypically low-performing urban school districts. Overall, the estimates suggest that incentives are not a panacea. Our experiment on teacher incentives revealed no statistically significant effects across myriad outcomes.

Yet, financial incentives in education are potentially powerful once we develop a deeper understanding of the right model for how children and teachers respond to financial incentives. In Houston, for instance, students who were provided incentives mastered 125 percent more math objectives than students who were not given incentives. Paying students to read books yields large and statistically significant increases in reading comprehension. Incentives for other inputs like attendance, wearing a school uniform, or doing homework did not significantly improve achievement. Thus, if nothing else, we have shown that students will respond to the incentives—but we have not yet discovered the best activities to provide incentives for. It is important to note that our work has barely scratched the surface of what is possible with incentive programs.

Using our experiences as a guide, we hope school districts, policy-makers, and scholars will try new and creative ways to increase student achievement with incentives and, perhaps even more importantly, rigorously assess the impact of their efforts.

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Bradley Allan is a project manager at the Education Innovation Laboratory at Harvard University (EdLabs). In this capacity he manages the ongoing research operations for district-based innovations. While much of his work has centered on implementing student incentive programs, he is currently supporting EdLabs' school turnaround work and planning for future experiments in human capital and technology. He holds a B.A. from the University of Virginia and an A.M. from the University of Chicago.

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Roland Fryer, Jr. is the Robert M. Beren Professor of Economics at Harvard University, a Research Associate at the National Bureau of Economic Research, and a former Junior Fellow in the Harvard Society of Fellows — one of academia's most prestigious research posts. In January 2008, at the age of 30, he became the youngest African-American to receive tenure from Harvard. He has been awarded a Sloan Research Fellowship, a Faculty Early Career Development Award from the National Science Foundation, and the inaugural Alphonse Fletcher Award (Guggenheims for race issues).

In addition to his teaching and research responsibilities, Fryer served as the Chief Equality Officer at the New York City Department of Education during the 2007–2008 school year. In this role, he developed and implemented several innovative ideas on student motivation and teacher pay-for-performance concepts. He won a Titanium Lion at the Cannes Lions International Advertising Festival (Breakthrough Idea of the Year in 2008) for the Million Motivation Campaign.

Fryer has published papers on topics such as the racial achievement gap, the causes and consequences of distinctively black names, affirmative action, the impact of the crack cocaine epidemic, historically black colleges and universities, and acting white. He is an unapologetic analyst of American inequality who uses theoretical, empirical, and experimental tools to squeeze truths from data — wherever that may lead.

Fryer is a 2009 recipient of a Presidential Early Career Award for Scientists and Engineers, the highest award bestowed by the government on scientists beginning their independent careers. He is also part of the "2009 Time 100," Time Magazine's annual list of the world's most influential people. Fryer's work has been profiled in almost every major U.S. newspaper, *TIME* Magazine, and *CNN*'s breakthrough documentary *Black in America*.

Endnotes

1. Author's calculations based on data from the 2009 Program for International Student Assessment, which contains data on sixty-five countries, including all OECD countries.

2. There were approximately 18,000 students in the treatment schools who actually received financial rewards.

3. This sentence describes Year 1. In the first year, schools were allowed to pick the other three metrics. Michelle Rhee, DC school chancellor at the time, suggested that individual schools may have better information on what behaviors are best to incentivize for that particular school. In Year 2, a third metric—performance on a biweekly assessment—was also mandated.

4. The structure changed slightly in the second year. In the second year, students began each 2-week pay period with the maximum of $20 per metric and were docked at least $2 for each behavioral or academic infraction.

5. The five courses were English, mathematics, science, social science, and gym. Gym may seem like an odd core course in which to provide incentives for achievement, but roughly 22 percent of ninth-grade students failed their gym courses in the year prior to the experiment.

6. The experiments were designed to detect effects of 0.15 standard deviations or more with 80 percent power. Thus, they are underpowered to estimate effect sizes below this cutoff.

7. In the Houston results, we were able to determine which math objectives completed by students were more tightly aligned with end-of-year outcomes. This figure includes all objectives. When including only objectives that were tightly aligned, the figure increases to 1.448 more months of schooling.

8. The Bagrut is the official Israeli matriculation certificate.

9. In 2007–2009, the period in which results from TAP are available, the program was not able to tie student achievement to individual teachers. TAP will transition to individual teacher-level metrics as they become available.

10. In the classic principal-agent framework, it is assumed that the agents' actions are not contractible, rendering moot the decision between inputs and outputs (Grossman and Hart 1983; Holmstrom 1979; Mirrlees 1974).

11. See, for instance, Cameron and Pierce (1994), Deci (1972, 1975), Gneezy and Rustichini (2000), or Kohn (1993, 1996) for differing views on the subject.

12. Ryan and Deci (1996) dispute many of these claims, arguing that the aggregation used in Eisenberger and Cameron (1996) was incorrect.

13. As the table subheader indicates, the effects summarized exclude student-reported spending or saving amounts above $300, due to students submitting so-called "nonsense" amounts in the thousands or millions of dollars.

14. Consent forms and other informational documents contained language about the potential risks of participation. Given the exchange of monetary incentives, the two primary potential risks were that those students who earn rewards could be targeted for theft or crime by their peers or others; and those low-income students and their parents receiving regular payments from the program could become dependent on the payments and could suffer financial harm after the payments stopped.

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THE HAMILTON PROJECT

ADVISORY COUNCIL

Highlights

Brad Allan of EdLabs and Roland Fryer of Harvard University and EdLabs propose a series of best practices for schools that wish to implement student incentive programs to boost student achievement using financial and nonfinancial rewards for behaviors that increase learning.

The Proposal

Student incentives based on goals that have been proven effective. Experiments with student incentives have shown that students respond well to incentives, and that incentives based on inputs such as reading books or doing homework are more effective than incentives based on outputs such as test scores or grades.

Programs tailored to and implemented by individual schools and districts. Student incentive programs are most effectively implemented on a local level, by teams working within districts or even schools. In this way, schools can find the incentives that work best for them, and no larger new infrastructure is needed.

Promising new directions for even larger benefits. Early results show that incentives may be even more effective when students, parents, and teacher are all encouraged to work together toward the same goal. There remain many exciting approaches to incentives that have not yet been explored.

Benefits

Widespread implementation of incentive programs can boost student achievement where they are needed most, especially among disadvantaged students where many interventions have been tried and have failed. Incentives are not a panacea, but they could play a significant role in the larger solution.

THE HAMILTON PROJECT

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BROOKINGS