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Teacher Pay Reforms

The Political Implications of Recent Research

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May 2009 Originally published in December 2006



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Executive summary

Education research convincingly shows that teacher quality is the most important *schooling* factor influencing student achievement. A very good teacher as opposed to a very bad one can make as much as a *full year's* difference in learning growth for students. Indeed, the effect of increases in teacher quality swamps the impact of any other educational investment, such as reductions in class size.

These findings (documented in this paper) suggest that improving the quality of the teacher workforce presents educational policymakers with a tremendous opportunity to dramatically improve the educational achievement of America's students. Unfortunately for policymakers, increasing teacher quality is no simple task: There does not appear to be any specific credential or characteristic that is a silver-bullet predictor of quality. This casts doubt on the prospects of using state licensure policy to determine who is eligible to teach (a "gatekeeper approach") to greatly improve the quality of the teacher workforce. Instead, I suggest here that policymakers may wish to address teacher performance through a focus on *teacher workforce* policies—that is, policies that are based on a teacher's actual demonstrated classroom performance.

Compensation is a key workforce policy that holds promise for reform. The reasons? Well, first off, there are some strong theoretical reasons to believe that the current pay system used by most school systems—the single-salary schedule—leaves room for improvement. It does not recognize the labor market reality that some teachers, based on their college quality and training, will have more competing opportunities outside of teaching than others. And, not all teaching jobs are alike, or even near alike as some schools and classrooms will be tougher to staff than others given their working conditions (which include the readiness to learn of their students).

Second, research shows that teachers are responsive to monetary incentives. Few school systems strategically use compensation as a policy tool to achieve various objectives: a fairer allocation of teacher quality across students, hiring and keeping teachers with key knowledge and skills, and increasing student achievement via measurable results. Finally, research on the small amount of experimentation with alternatives to the single-salary schedule—various forms of individual or group-based merit pay, pay for specific knowledge and skills, and so-called combat pay for teaching in high-needs schools—generally suggests that teacher pay reform can be an effective way to achieve policy objectives.

But there are significant obstacles facing policymakers who wish to use compensation as a tool for influencing the quality of the teacher workforce. Many aspects of teaching make it less amenable to salary differentiation, particularly in the form of merit pay, than other private sector occupations. Teachers' jobs are complex and multidimensional, and we know very little about how to objectively and accurately quantify their productivity. It is therefore necessary to exercise caution as implementing the wrong type of incentives might encourage teachers to focus on a narrow set of objectives and discourage collaboration.

At the same time, there are ways to design pay systems to help avoid pitfalls, and we know from private schools that even the most controversial type of pay differentiation—merit pay—can work in a K-12 education setting. As this paper will describe, experiments along these lines in select state and urban school systems indicate that education reform in this direction holds significant promise for American students.

Still, major hurdles to implementing pay reforms remain, including significant union opposition, the dynamic of local school district politics, and the institutional inertia of public school systems. Despite these obstacles, teacher pay reform appears to be high on the policy agenda. As we shall see, a number of states and localities are engaged in high-profile experiments with alternatives to the single-salary schedule, and the federal government is encouraging these experiments through grants to states and school districts for developing and implementing innovative teacher pay structures.

Based on this review of what we know about teacher pay and reform, this paper will argue that pay reform holds promise, and then offer the following recommendations for those who wish to see teacher pay reforms successfully implemented:

- **Teacher pay reform is much more likely to be successful if the reform takes place at the state level.** States, unlike most localities, have the capacity to develop data and analysis systems that can credibly be used to assess significant areas of shortage, track teacher performance, and administer a differentiated pay system. And from a political perspective, it may be necessary to engage state governments in this effort in order to buffer some of the negative local political consequences arising from various pay reforms.
- **States must make basic investments in their education data infrastructures.** Relatively few states have databases that permit the linkage of teachers to their students and the tracking of both over time. Much of what we now know about teacher quality has been learned from analyses of these states, as this report will demonstrate. This type of data structure is really a prerequisite for assessing teacher effectiveness (in the context of determining merit pay policies) or for analyzing the efficacy of state policies (when considering combat pay policies such as the ones we will examine shortly).

- **More basic research is needed on the data and methodological requirements for using student achievement tests as a gauge of teacher effectiveness.** Research has clearly demonstrated that it is no simple task to isolate teachers' contributions toward student achievement or to know how much student and teacher data is necessary in order to make strong inferences about the differences in performance between teachers. Mistakes about teacher performance carry particularly high stakes when performance is linked to teacher pay. Any such errors would seriously undermine political support for compensation reforms—and could even lead to legal action.
- **States and localities need to engage in a number of pay experiments.** Furthermore, there must be *independent* evaluation of these experiments, as opposed to evaluation by individuals or organizations having a stake in the outcome. So few pay reforms have been analyzed to date that we have very little information about the efficacy of any particular reform structures.

Pay is certainly not the only way to manage a workforce, but it is one of the primary policy tools that school systems have at their disposal. The strict adherence to the traditional single-salary schedule therefore strips school districts of a key managerial tool. Even though the research on teacher compensation reform is hardly definitive enough to recommend the use of specific pay reforms to reach specific goals, the few quantitative studies that do exist suggest that a more strategic use of teacher compensation could lead to both a more equitable allocation of teachers among students and increased student achievement.

Introduction

Arguments for reforming teacher compensation

Education research convincingly shows that teacher quality is the most important *schooling* factor influencing student achievement. A very good teacher as opposed to a very bad one can make as much as a *full year's* difference in learning growth for students.¹ Furthermore, the effect of increases in teacher quality swamps the impact of any other educational investment such as reductions in class size.²

Such findings suggest that improving the quality of the teacher workforce presents educational policymakers with a terrific opportunity for dramatically improving the educational achievement of America's students. But how to define "teacher quality"—an oft-used but ill-defined term? In the context of this paper, "teacher quality" is the *ability of teachers to contribute in measurable ways to student gains on standardized tests*.³ This is admittedly a narrow conception of what teachers do, yet a focus on this measure of teacher quality is useful both because these tests generally do represent an important measure of genuine learning and because measured student performance on these tests is driving many educational policies today.

Unfortunately for policymakers, increasing teacher quality is no simple task. Policies targeted at new entrants in the labor market are by definition incremental in that they only affect the flow of new teachers, which represents a small fraction of the total labor force. An even more troubling policy issue is that there does not appear to be any specific credential or characteristic that is a silver-bullet predictor of quality, making it especially difficult to craft policies to attract and retain the "right" teachers based on paper credentials alone. In fact, the latest research casts considerable doubt on the prospects of using state licensure policy to determine who is eligible to teach (a "gatekeeper approach") to significantly improve the quality of the teacher workforce.

A primary reason that a gatekeeper approach is unlikely to dramatically improve teacher quality is that there is far more variation in observed teacher effectiveness *within* a particular teacher category—such as certification area—than *between* categories.⁴ Recent research by Thomas Kane, Professor at Harvard University's Graduate School of Education, and his colleagues, for instance, aptly illustrates this in their investigation of the relationship between a teacher's route into the classroom via traditional certifica-

tion and various alternative routes (such as the Teaching Fellows Programs or Teach For America) and student achievement. They estimate that the average difference in performance between particularly effective teachers (those in the top fifth of the performance distribution) as compared with particularly ineffective teachers (those in the bottom fifth) was roughly 10 times the average difference in performance between teachers who enter the profession through different teaching routes. These findings echo a large body of research that suggests far more variation in teacher quality exists than previously thought.⁵ The upshot: *Teachers who look the same on the surface, in terms of credentials, may actually be more different than they are alike.*⁶

The importance of teachers coupled with the findings on the variation in their quality has significant practical implications. Tweaking existing teacher ‘gatekeeper’ policies—those that determine employment eligibility such as teacher certification (also commonly referred to as teacher licensure)—are unlikely to be effective because any litmus test used to determine eligibility to teach is only as effective as the strength of the correlation between the credentials required and student achievement.⁷

If the required credentials are only weakly correlated with student achievement, it will result in significant numbers of ‘false positives’ and ‘false negatives’—that is, many applicants who satisfy the criteria for employment eligibility turn out to be ineffective teachers (false positives), and many who do not satisfy the criteria but who would have been effective in the classroom had they been allowed into the teacher workforce (false negatives). The false negatives may never persevere to become teachers—a loss to the profession—and the false positives may be difficult to remove from the classroom once they have attained the job security, via tenure, which typically exists in public schools.

Given the shortcomings of teacher gateway policies, policymakers may wish to focus instead on *teacher workforce policies*—that is, policies that are based on a teacher’s actual demonstrated classroom performance.⁸ Compensation is one key policy that holds promise for reform. For example, the idea of merit pay—linking teachers’ pay to their classroom performance—flows naturally out of a system that focuses on measured outputs, such as student learning gains. The desire to link teacher pay to performance is but one argument for moving away from the predominant structure of compensation in teaching: the single-salary schedule whereby a teacher’s salary is determined by his or her degree and experience level alone.

The rigidity of this structure helps explain, at least to some extent, why schools face persistent difficulties in recruiting and retaining teachers with specific skills. What’s more, the well-documented inequitable distribution of teachers (as measured by their experience levels and credentials) across schools and students is clearly evident in school districts across the country. As Hamilton Lankford, Professor of Economics at the University of Albany, and his colleagues show in their 2002 paper “Teacher Sorting and the Plight of Urban Schools: A Descriptive Analysis,” there is considerable between- and within-school

district inequity in the distribution of teachers, with the most needy students tending to be assigned to the least credentialed teachers. And, in their 2004 paper, “Why Public Schools Lose Teachers,” Eric Hanushek, the Paul and Jean Hanna Senior Fellow at the Hoover Institution of Stanford University, and his colleagues show that public schools serving high-poverty students need to offer teachers considerable monetary incentives to compensate them for the difficulty of their working conditions.

Simply put, pay systems in public education do not typically recognize the labor market realities that some teachers will have more competing and financially attractive opportunities outside of teaching than others. Nor do some pay systems admit that some schools and classrooms will be tougher to staff because of the nature of the particular teaching job. But it should come as no surprise that few school systems are willing or able to experiment with compensation reform, given the significant hurdles—both technical and political—that make the use of alternatives to the single-salary schedule somewhat dicey.

This paper will explore the potential for compensation reform as a teacher workforce policy, reviewing what we do and do not yet know about the value of reforming the way teachers are compensated, as well as the politics of compensation reform and what those politics imply about policymaking at the state and local level at which various reforms might take hold. The first section of the paper will focus on private-sector compensation structures in order to draw some inferences about the magnitudes of pay differentials that might be necessary to attract and retain teachers with particular skills. The second section will assess what we have learned about teacher pay alternatives from actual experimentation with them in education.

The last section will discuss some of the obstacles facing policymakers who wish to use compensation as a tool for influencing the quality and distribution of teachers. The conclusion, as we shall see, is fairly self-evident: Pay is certainly not the only way to manage a workforce, but it is one of the primary policy tools that school systems have at their disposal. The strict adherence to the traditional single-salary schedule strips school districts of a key managerial tool. And while the research on teacher compensation reform is hardly definitive enough to recommend the use of specific pay reforms to reach specific goals, the few quantitative studies that do exist suggest that a more strategic use of teacher compensation could lead to both a more equitable allocation of teachers among students and increased student achievement.

School districts can't escape labor market realities

The overwhelming majority of public school teachers are paid according to a “single” or “uniform” salary schedule. Under this compensation design, individual salaries are based solely on a teacher’s degree and experience level. This implies that all teachers in a given district using the single-salary schedule, having the same degree and years of experience, will receive the same salary regardless of their individual training or field of specialization, their school/classroom work environment, and/or their actual job performance.⁹

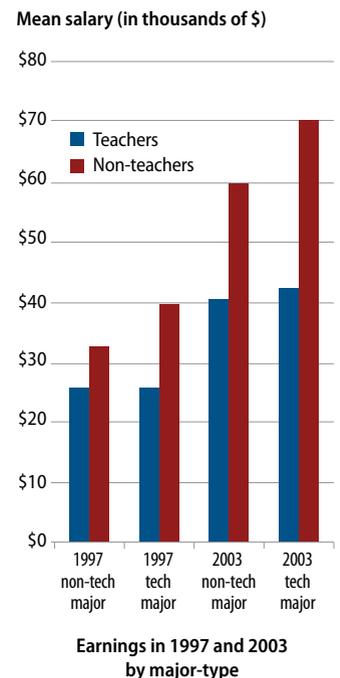
Private sector compensation, in contrast, generally reflects not only individual attributes (often including an individual’s performance on the job¹⁰) but also the attributes of a particular job. Specifically, researchers find that, in the private sector, salaries tend to be positively correlated with measures of academic competency such as an individual’s performance on standardized tests or the selectivity of the college from which the individual graduates.¹¹ They also reflect the supply-and-demand conditions for particular fields or occupations, and differential pay by field *within* professions is quite common.¹²

The difference between the basis of compensation in public schools and the private sector infers that individuals with attributes or skills that are better rewarded in the private sector will tend to make greater financial sacrifices to teach than others (in economic parlance, they have different “opportunity costs”). The magnitude of these differences can be striking. For example, analyses of the National Center for Education Statistics *Baccalaureate and Beyond* dataset, which tracks a cohort of 1993 college graduates, shows that the annual salary of teachers (based on a shorter work-year) tends to be lower than the annual salary of college graduates who are employed in alternative occupations.¹³ Far more striking, however, is the finding that employees who have technical training, such as a math or science major in college, and who choose to teach, appear to sacrifice far more financially by doing so than do employees who lack technical training.

Specifically, as Figure 1 shows, four years out of college the gap in salary between teachers and non-teachers who have technical training is \$13,469, but only \$6,811 for those who do not have technical training.¹⁴

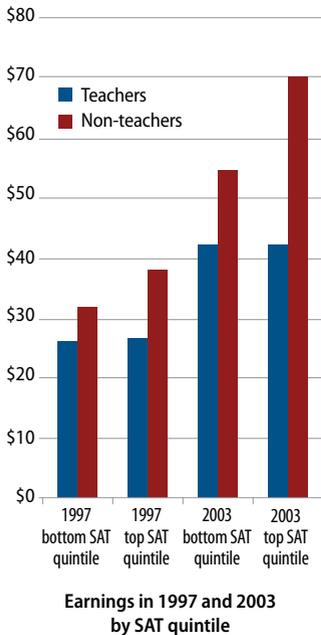
Furthermore, this gap grows as employees progress through their careers. Ten years out of college, the gap between teachers and non-teachers who have a technical major is \$27,890; the gap is \$18,904 for those who hold a non-technical degree. In other words, the *gap*

Returns to major by occupation



Returns to major by occupation

Mean salary (in thousands of \$)



between teachers and non-teachers in earnings is far larger for college graduates who have a technical major than those who do not. It should therefore come as little surprise that school systems face particular difficulties recruiting math and science teachers.¹⁵

Figure 2 illustrates that the story is similar when one focuses on the SAT scores of college graduates: The financial sacrifice associated with teaching is larger for college graduates with higher SAT scores.¹⁶

For example, the early-career salary gap between teachers and non-teachers for those who score in the lowest quintile is \$5,302, compared with a gap of \$10,709 for those who score in the top quintile. By the time individuals are 10 years out of college, the gap between teachers and non-teachers in the lowest quintile is \$13,036, but it has grown to more than \$28,533 for those in the top quintile.¹⁷ Not surprisingly, the non-teacher labor market again rewards ability at a much higher rate than the teacher labor market, with the teacher labor market actually giving a slight premium to those with the lowest SAT scores in 2003.

These findings on compensation show that salaries for high-aptitude workers or those with technical training grows much faster outside of teaching, and likely helps explain the fact that college graduates with higher test scores or who have technical training are less likely to enter the teaching profession than other occupations.¹⁸ For example, in a 2003 U.S. Department of Education publication, “Occupational Choices and the Academic Proficiency of the Teacher Workforce,” Dan Goldhaber and Albert Liu show that in a sample of recent college graduates, those who report considering a career as a teacher have SAT scores that are, on average, about 40 points lower than those who do not, and college graduates who become teachers have SAT scores that are more than 50 points lower than those who enter a different occupation.

This becomes more pronounced as individuals progress through their careers. High-scoring teachers and those with technical training are the ones most likely to leave the profession. Robin Henke, Associate Director of Statistical Analysis and Data Design at MPR Associates, Inc., and her colleagues find in their 2000 paper, “Progress Through the Teacher Pipeline: 1992-93 College Graduates and Elementary/Secondary School Teaching as of 1997,” that teachers whose entrance exam places them in the top quartile of the performance distribution are about twice as likely to leave the teaching profession (in the first four years) as those whose exam places them in the lowest quartile.

Similarly, Richard Murnane, The Juliana W. and William Foss Thompson Professor of Education and Society at Harvard University, and his colleagues find in their 1991 book, *Who Will Teach?*, that high-school science teachers tend to leave the profession at much faster rates than do elementary school or history teachers. In Michigan, for instance, the attrition rate of chemistry and physics teachers reached 50 percent by the end of two years of teaching, but it took twice as long to reach 50 percent for social studies teachers and three times as long for elementary school teachers.¹⁹

The differential in aptitude (measured, for instance, by SAT scores) between teachers and non-teachers is certainly a concern given empirical evidence that higher-aptitude teachers tend to be more effective in the classroom. And it is a growing concern given the decline in the aptitude of teachers over time.²⁰ As Sean Corcoran, Assistant Professor of Educational Economics at New York University, and his colleagues discuss in their 2004 paper, “Women, the Labor Market, and the Declining Relative Quality of Teachers,” the likelihood that a female teacher will have been among the highest-scoring (on a standardized achievement test) among high-school students in the top 10 percent dropped by more than half, down from about a 20 percent probability in 1964 to about a 10 percent probability in 2000. The authors argue that the primary explanation for this is that the opportunities for women outside of teaching have expanded dramatically over the last four decades.

However, Caroline Hoxby, Professor of Economics at Harvard University, and Andrew Leigh, Fellow of Social Policy Analysis in the Research School of Social Sciences’ Evaluation and Research Centre at the Australian National University offer a different argument for the decline in the relative aptitude of the teacher workforce. In their 2005 paper, “Wage Distortion: Why America’s Top Female College Graduates Aren’t Teaching,” they argue that the decline results from a change between teaching and other occupations in relative wage compression.²¹ In particular, the increased wage compression in teaching means that an individual opting to teach is far more likely to receive a salary that is close to the average than if he or she had opted instead for a non-teaching profession. As a consequence, more and more over time, teaching became an increasingly financially attractive occupation for lower-aptitude individuals whose compensation (in teaching) tends to be dragged upward toward the mean, and a less financially attractive occupation to those with higher aptitude whose compensation tends to be dragged downward toward the mean.

In short, the findings indicate that the single-salary schedule does not reward individuals who do well on standardized tests or who major in technical subjects as richly as does the labor market as a whole. It is not surprising then, that individuals appear to respond (at least anecdotally, based on the distribution in skills between teaching and non-teaching occupations) to these incentives.

What do we know about compensation reform in teaching?

For compensation reform policies to be an effective tool for changing teachers' career paths or behavior, they must be motivated by concerns over salary. This may seem an obvious point not worth debating, but in fact much of the rhetoric surrounding pay reform in teaching subtly suggests that teachers are less driven by monetary concerns than employees in other sectors of the economy.

Euphemisms such as “teachers are in it for the children, not the money” or “it’s a calling” may imply, to at least some degree, a diminished role of compensation as a motivator for a teacher’s career decisions. And while it *may* be true that those who choose teaching as an occupation tend, on average, to more highly value the non-pecuniary aspects of a job (working with children on a daily basis), it does not necessarily follow that compensation is not an important factor in their decisions. One might imagine, for example, that all things being equal, would-be teachers will accept \$5,000 or \$6,000 less than what they could make in the next best non-teaching job, but will they accept \$8,000 or \$9,000 less? At some point, there is a salary differential where the answer is most certainly no. This logic will apply not only to decisions to enter the teaching profession, but also to decisions over whether to remain a teacher and decisions about where to teach.

Money does influence teachers' career paths

There is, in fact, ample evidence that teachers are sensitive to differences in compensation, especially when they work in high-minority and high-poverty schools.²² Sheila Kirby, Senior Economist and Associate Director of the RAND Washington Office and her colleagues, in their 1999 paper “Supply and Demand of Minority Teachers in Texas: Problems and Prospects,” estimate that every \$1,000 increase in beginning teacher salaries lowers teacher attrition by about three percent. But, the effect of teacher pay is even more pronounced in high-risk school districts where the same \$1,000 increase is estimated to decrease attrition by more than six percent.²³

Most of what we know about the responsiveness of teachers to the non-pecuniary characteristics of a given job that make it an attractive or unattractive position is based on analyses of the observed pattern of teacher career decisions.²⁴ And, by almost any measure of their attributes or credentials, highly qualified teachers are inequitably distributed

across districts, schools, and classrooms.²⁵ This is no surprise: In the absence of pay adjustments for differences in job amenities or difficulty, to the extent that they are able, teachers will gravitate toward positions that are more desirable. Teachers with more labor-market bargaining power—those who are highly experienced, credentialed, or judged to be better—will therefore tend to be teaching in nicer settings with lighter work-loads. As a consequence, the most-needy students tend to be paired with the least-qualified teachers.

Hamilton Lankford and his colleagues starkly illustrate this point in “Teacher Sorting and the Plight of Urban Schools: A Descriptive Analysis.” They use a dataset that tracks virtually all teachers in New York state and show that nonwhite, poor, and low-performing students are more likely to be taught by less-qualified teachers, as measured by experience and degree levels, licensure status and exam performance, and college selectivity. For example, they find that in New York state, 21 percent of nonwhite students and 28 percent of poor students have teachers who have failed either the General Knowledge or Liberal Arts and Science certification exam, compared with only 7 percent of white students and 20 percent of non-poor students whose teachers failed one of these tests.

Few public school districts offer salary differentials that would adequately account for the non-pecuniary aspects of particular teaching assignments.²⁶ Nor do they typically differentiate in ways that would account for differences in an individual’s background or job performance. In fact, data from the 1999-2000 *Schools and Staffing Survey*, a nationally representative sample of schools, suggests that more than 70 percent of school districts adhere strictly to the single-salary schedule, implying that salaries are not differentiated along any of the aforementioned dimensions.²⁷

While the overwhelming majority of public school districts have stuck with this method for compensating teachers, over time there has been some pay-reform experimentation in public schools. Most of it should probably be considered tinkering around the edges, involving only an overlay of alternatives on top of the single-salary schedule. And, not surprisingly, the differentials that have been offered to reward performance or the acquisition of specific knowledge and skills, to attract individuals in high-needs areas, or to entice teachers to work in challenging schools with so-called combat pay, tend to be relatively small.

Pay for performance

Merit, or performance, pay plans are perhaps the most widely advocated and controversial compensation reform strategy. Calls for merit pay are not at all new: They are in fact a key policy recommendation of the 1983 *A Nation at Risk Report*. Today, there are a number of major school systems, among them Denver and Houston, and states, such as Florida, Idaho, Minnesota, Mississippi, and Texas, all of which are either currently experimenting with a merit pay program, or about to launch one.

Public school experimentation with merit pay appears to be less controversial when whole schools are evaluated, and a bonus is awarded, to entire groups of teachers. South Carolina and Tennessee, for instance, have experimented with awarding schools additional funding based on the performance of their students.²⁸ Although they differ from one another in some respects, both state systems compare school-wide gains in student scores over time to what statistical models predict the gains to be, after controlling for students' demographic characteristics. South Carolina's "school-gain index," for instance, was based on how well students in a particular school perform on both a state and a national standardized test relative to that same school's performance in the previous year. This index accounted for the socioeconomic status of students, which was based on the percentage of students receiving free or subsidized lunches. Awards were shared among schools in each year so there was no fixed sum of money received by outstanding schools, but typical awards per school ranged from \$15,000 to \$20,000.

In contrast to South Carolina's focus on measures of the gain in student performance, Kentucky set future proficiency standards and rewards schools based on progress towards those goals over time, with more points awarded for higher-performing students. The awards in Kentucky amounted to about \$2,000 per teacher in eligible schools, or a total appropriation of \$26 million.²⁹

Experimentation with individually based merit pay plans, such as the widely publicized experiments in Denver and Houston, has occurred in a number of school systems over the last couple of decades.³⁰ Although the Denver teacher pay plan has been touted as "merit pay," it is really a hybrid system that awards teachers additional compensation based on four categories: knowledge and skills, demonstrated by holding an advanced degree; professional evaluation from administrators; market incentives for teaching in hard-to-staff positions or hard-to-serve schools; and various measures of student performance. Excluding the incentives for an advanced degree, an individual teacher stands to gain upwards of \$5,000 per year by meeting all the criteria.³¹

By contrast, the merit pay program just adopted in January of 2006 by the Houston Independent School District is designed to be a pure merit plan, where teachers are to be evaluated based on student performance on the Texas state assessment. As constructed, the Houston school system's plan will pay annual bonuses worth as much as \$3,000 today (with an intention to increase this amount to \$10,000 in the next five years) to teachers whose students demonstrate strong gains on standardized exams.³²

Another well-known, long-standing performance pay plan is the one implemented in Douglas County, Colorado. This plan awards incentives of up to \$2,500 for "master teachers," \$1,250 for "outstanding teachers," \$700 for teachers taking on additional responsibilities, \$350 for teachers who complete specified skills training, and an average of \$413 for teachers participating in group incentive plans.³³ Also well known is the Teacher Advancement Program, or TAP, developed by the Milken Foundation but implemented

in a number of different schools and districts.³⁴ Under TAP, teachers are awarded bonuses based on both observed instructional performance as well as student achievement growth. The magnitude of awards available to teachers using the TAP system varies by school.

When public school systems use merit pay, the incentives offered are generally thought to be quite small. Dale Ballou, Associate Professor of Public Policy and Education at Vanderbilt University, and Michael Podgursky, Professor of Economics at University of Missouri–Columbia, in their 1997 book, *Teacher Pay and Teacher Quality*, estimate, based on a 1991 national sample of public schools, that the average magnitude of the incentives offered for performance is about two percent of a teacher’s base pay, but for private schools, where the administration is not bound by the single-salary schedule, the average merit award is 11 percent of the teacher’s base pay.

In the non-teacher labor market, incentive pay varies widely by industry. However, it is generally accepted that the right incentive mechanism for a particular industry can have a large effect on productivity. For example, Edward Lazear, Morris Arnold Cox Senior Fellow at the Hoover Institution, showed in his 1996 paper, “Performance Pay and Productivity,” that the Safelite Glass Corporation was able to increase productivity by 20 percent per worker by instituting a pay-for-performance plan that ended up increasing the average worker’s wage by only 10 percent. That said, there are some legitimate reasons why this compensation structure may not work well in public schools, which will be examined in greater detail in the next section of the paper.³⁵

There exists among many a perception that merit pay has failed in public education, though this perception of failure has more to do with the politics surrounding the issue than any actual assessment of the value of this pay reform as a tool for increasing student achievement. Case in point: In their 1994 case study of 18 school districts that had experimented with merit pay plans, “*Issues and Case Studies in Teacher Incentive Plans*,” Harry Hatry, Director of the Urban Institute’s Program on Public Management, and his colleagues concluded that “[b]y and large, the school districts we examined did not succeed at implementing lasting, effective, monetary or non-monetary incentive plans, ones that had a demonstrated ability to improve student learning.” Yet the study also acknowledges that “[v]ery few of the participating districts had attempted any systematic evaluation of the effects of their incentive plans on student achievement.”

The few actual studies of the impacts of merit pay on student achievement suggest that, if anything, it has positive benefits for student achievement.³⁶ For example, Victor Lavy, William Haber Chaired Professor of Economics at Hebrew University of Jerusalem, in his 2002 paper, “Evaluating the Effect of Teachers’ Group Performance Incentives on Pupil Achievement,” compares the effects of two monetary interventions given by Israel’s Ministry of Education, a “teacher incentive” intervention and a “school resources” intervention.³⁷ The teacher bonuses for the winning schools ranged from about \$200 to \$715 per teacher; the higher bonus represented about 2.5 percent of the average salary of teach-

ers and the lower bonus amount somewhat less than one percent. Lavy finds that the merit pay plan helped significantly increase the number of credit units (defined as the difficulty of course work in a subject area of study) taken by students and reduce dropout rates. The resources plan also had a positive impact on credit units, but no effect on dropout rates. Based on a comparison of the size of the benefits and the costs of the two programs, Lavy concludes that the incentive was more cost effective than the resource intervention.

David Figlio, Knight-Ridder Professor of Economics at the University of Florida and Research Associate at the National Bureau of Economic Research, and Lawrence Kenny, Professor of Economics at the University of Florida, find, like Lavy, in their 2006 paper, “Do Individual Teacher Incentives Boost Student Performance?” that teacher incentives appear to improve student outcomes. They investigate an individually based merit pay program by combining data from the *National Education Longitudinal Survey* with their own survey on the use of incentives. The precise performance plans they investigate vary from school to school, but the authors find that merit pay plans do have positive impacts on student achievement (they add test performance across four areas: reading, mathematics, science, and history). The effects are relatively small in magnitude, ranging from 1.3 to 2.1 points on a test having a standard deviation of 33, but merit pay appeared to be effective when other types of interventions, such as more frequent teacher evaluation, were not.³⁸

Pay for knowledge and skills

A far less controversial departure from the single-salary schedule than merit pay is pay for “knowledge and skills,” whereby teachers are awarded additional compensation based on having demonstrated special skills.³⁹ Probably the best-known and most widespread example of this is the additional compensation awarded to teachers who become certified by the National Board for Professional Teaching Standards. NBPTS certifications are growing in popularity among a significant number of states and school districts, with many of them adopting incentives designed to reward teachers for becoming NBPTS-certified, and in some cases these rewards are quite large. North Carolina, for instance, provides teachers a 12 percent salary increase for being NBPTS-certified, representing an average bump in salary of more than \$5,000. And, in 1998, the Louisiana state legislature mandated a nominal \$5,000 increase in salary for NBPTS-certified teachers for the 10-year life of the certificate.⁴⁰

Research on the student achievement effects of NBPTS-certified teachers suggests they tend to have positive effects on student achievement, though the findings are somewhat mixed.⁴¹ The variation in quality among teachers who are certified, however, suggests that policymakers wishing to directly link teacher pay to student achievement may do better by adopting a pure merit-pay approach that targets pay more directly toward this purpose.⁴²

It is certainly no coincidence that, where success is measured by the adoption of the reform, paying teachers for specific knowledge and skills—especially NBPTS certification—has been the more successful approach. Knowledge- and skills-based pay plans

sidestep some of the thorniest issues associated with differentiation of teacher salaries: fairness and the perception that awards may be doled out by arbitrary decisions or based on arcane statistical models.

Pay for high-needs areas

Pay for high-needs areas is really a type of knowledge- and skills-based pay system, but this deserves to be examined as a separate sub-category because, unlike pay for knowledge and skills (which is generally designed to be consistent from year-to-year), pay for high-needs areas may shift as the needs change from year-to-year.

This type of compensation reform is also far less controversial among teachers than performance pay. In a recent Public Agenda survey of teachers, 44 percent of public school teachers who have taught five years or less think it is a good idea to pay higher salaries to math and science teachers.⁴³ Financial incentives vary, and can include bonuses, housing subsidies, tuition assistance, or tax credits.⁴⁴ While there are selected examples of larger incentives, the magnitude of the salary differentials tends to be in the range of \$1,000 to \$5,000 (often in the form of a one-time bonus). In the last decade, Houston and Los Angeles paid teachers in high-demand subjects a \$5,000 bonus, and New York paid an additional \$3,400 to teachers for up to four years.⁴⁵

Recall from the previous section that the differential in opportunity cost for individuals with and without a technical major in the non-teacher labor market appears to be in the neighborhood of \$11,000 annually, thus in comparison a one-time bonus of even \$5,000 appears quite small. Furthermore, the examples cited above represent exceptions; the great majority of states and school districts in the country do not use pay differentials to attract teachers with critical skills. According to the 1999-2000 SASS, only about 10 percent of school districts nationwide currently offer compensation designed specifically to recruit or retain teachers in fields of shortage.⁴⁶

Pay for high-needs schools (“combat pay”)

Incentives designed to entice teachers to teach in high-needs schools, when they exist, also tend to be relatively small. Philadelphia, for example, offered a \$2,000 bonus to teachers willing to work in schools that were deemed to be hard to staff, and Palm Beach County, Florida, offered \$5,000 to new hires teaching in a Title I school for four years.⁴⁷ Again, it should be noted that these programs tend to be the exception and not the rule. The 1999-2000 SASS estimates that less than 4 percent of districts surveyed use this type of incentive pay.⁴⁸

The magnitude of the differentials offered to entice teachers to work in schools serving disadvantaged student populations appear small relative to statistical estimates (discussed above) of the value that teachers place on the type of students they teach. Ironically,

this may have limited their utility. Widely distributed articles that make the case for pay differentiation also argue that the differentials (either for critical skills or teaching disadvantaged students) have to be “large” in order to be “meaningful.”⁴⁹ For example, in “Why Public Schools Lose Teachers,” Eric Hanushek and colleagues estimate that typical teachers would need a 20 percent-to-50 percent increase in their salaries to accept a position teaching disadvantaged students; and Cynthia Prince, Senior Analyst at the American Association of School Administrators, in her 2002 paper, “The Case for Financial Incentives,” describes how a \$20,000 bonus in Boston was still not enough to draw math and science teachers away from the private industry.

Facing budgetary or political constraints and believing that they will have little or no impact, school districts may opt not to create salary incentives. Thus, it is important to emphasize that, from an economic standpoint, a salary incentive of any size is likely to help encourage teachers to take difficult job assignments. In fact, one of the few (or possibly only) studies of such a program suggests that relatively modest differentials can make a difference. In their 2006 paper, “Would Higher Salaries Keep Teachers in High-Poverty Schools? Evidence from a Policy Intervention in North Carolina,” Charles Clotfelter, Z. Smith Reynolds Professor of Public Policy Studies and Professor of Economics and Law at Duke University, and his colleagues study the North Carolina Public Schools Bonus Program (for the period from 2001-04), which awarded \$1,800 annually to teachers in hard-to-staff subjects and schools. They find that this amount was enough to reduce turnover rates by roughly 12 percent. In addition, they suggest that, were it not for misunderstandings and miscommunications about the permanence of this program, this estimate could have been twice as large.⁵⁰

Relatively little of what we know about the effects of salary differentiation in public schools has been gleaned from actual experimentation with the single-salary schedule. This is not surprising, as reforms tend to be adopted quickly and be relatively short-lived, conditions that make it difficult to obtain the type of data that might convincingly inform public policy about the impacts of teacher pay reform. While the existing research tends to support the notion that compensation reforms hold promise, the lack of information likely serves as an impediment to further reform. This is just one of numerous obstacles faced by policymakers wishing to implement teacher pay reforms.

Hurdles to implementing teacher pay reforms

While there are many sound arguments for implementing teacher compensation reforms, relatively few districts have done so. There are several broad, and interrelated, explanations: technical challenges, union power, school district politics, and institutional inertia.

Technical challenges

Technical hurdles exist for all kinds of differentiated pay. The human resource management of a differentiated pay system, for example, would likely stretch most school systems. But it is the most controversial teacher pay reform—merit pay—that presents the greatest technical challenge so I focus primarily on it.

Skeptics suggest that merit pay would not work in the teaching profession given the nature of the job. Avinash Dixit, Professor of Economics at Princeton University, in his 2002 comprehensive overview of the theoretical and empirical literature on the use of pay incentives, “Incentives and Organizations in the Public Sector: An Interpretive Review,” finds that merit pay is less likely to be used in jobs that are complex and multidimensional in objective and where it is difficult to accurately quantify employee productivity.

As Richard Murnane and David Cohen, John Dewey Collegiate Professor of Education and Walter H. Annenberg Professor of Education Policy at University of Michigan, point out in their 1986 case study of districts that experimented with merit pay, “Merit Pay and the Evaluation Problem: Why Most Merit Pay Plans Fail and Few Survive,” these conditions aptly describe key aspects of the teaching profession. In particular, the worry about performance-based compensation is that it would create inappropriate incentives for teachers. For instance, one would not want teachers to focus exclusively on improving student achievement on standardized tests, which may cover only a narrow set of subjects or content within subjects, often referred to as “teaching to the test.” Nor would one want to discourage collaboration among teachers within or between schools. And it would be a disaster, both politically and in terms of providing examples of successful teaching, if the reward system were unfair or capricious, such that it did not accurately reflect teaching excellence that might be modeled by other teachers seeking to improve their own practice.⁵¹

These concerns are legitimate, but not necessarily insurmountable. We know that merit-based pay exists in a variety of different work settings that require collaboration and produce an amorphous product. And as has been widely noted, the far more extensive use of merit pay in the nation's non-sectarian private schools suggests there is nothing inherent in the schooling context that precludes its use in public schools.⁵²

It is also true that some of the potential problems with paying teachers for performance can be addressed directly through the structure of the incentive system. For instance, as noted above, we have examples of merit pay plans that include multiple indicators of teacher performance (thus addressing the issue of teaching to the test). Besides, it is not necessary to base performance directly on student test scores. For instance, Thomas Dee, Associate Professor of Economics at Swarthmore College, and Benjamin Keys, Jacob K. Javits Fellow and Student Associate at the University of Michigan's Population Studies Center, find in their 2004 paper, "Does Merit Pay Reward Good Teachers? Evidence from a Randomized Experiment," that teachers judged (and financially rewarded) by Tennessee's Career Ladder Evaluation System to be more advanced were in fact more effective at producing student achievement. And, a 2006 paper, "Principals as Agents: Subjective Performance Measurement in Education," by Brian Jacob, Assistant Professor of Public Policy at Harvard University, and Lars Lefgren, Assistant Professor of Economics at Brigham Young University, suggests that principals generally do a good job of distinguishing teachers who increase student achievement (on standardized tests) the most and the least from those in the middle.

Furthermore, as previously discussed, there are certainly examples of states and school districts that base compensation on demonstrated knowledge and skills thought to be correlated with teacher effectiveness. The downside, of course, is that a system that relies on rewarding teachers based on correlates to student achievement will never be as accurate at targeting teachers who contribute to students' test performance as one based on actual student achievement.

Another alternative that addresses some of the technical concerns about merit pay is school-based performance awards. A school-based award sidesteps any potential within-school collaboration problems by creating an incentive for all teachers in a school to increase student achievement. School-based awards also get around the problem of how to evaluate teachers in non-tested subjects. The downside, however, of a (strictly) school-based system is that the incentive is diffuse. As Daniel Hansen, Professor and Chair of the Department of Economics at UCLA, points out in his 1997 paper, "Worker Performance and Group Incentives: A Case Study," there may be a tendency for some to try to free-ride when the focus of accountability is on a group rather than an individual.

The idea of basing compensation, at least in part, on assessments of the effectiveness of individual teachers holds appeal and appears to be the direction in which policy is headed, at least as shown by recent high-profile experiments with district pay-for-performance in Denver and Houston and legislative action in states such as Florida, Iowa, and Minnesota.⁵³ Consequently, it is worth exploring this matter in greater depth.

Perhaps the thorniest issue in the context of individually based teacher rewards is that of fairness, the political ramifications of which will be discussed below. But there are also technical issues involved. In particular, while performance-based pay policies designed to reward teachers for their contribution toward students' performance sound sensible and straightforward, they presume an ability to accurately and fairly measure teacher effectiveness based on student test performance.

Researchers have explored various ways of separating the effect that teachers have on student achievement from other important contributors, such as parental or peer influences.⁵⁴ They have also assessed the impact of test design on the ability to discern true student learning gains.⁵⁵ And while such research has taught us valuable lessons about the appropriate ways to measure teacher effectiveness, it is an overstatement to suggest that debates about how precisely to measure teacher contributions to student learning are anywhere close to settled.

Another related technical challenge is deciding how much data is necessary before it is appropriate to make judgments about teachers. Relatively little research has been done on the extent to which teacher effectiveness, at least as measured by student test scores, is a stable characteristic. Thus, policymakers have little to guide them about how many years of matched student and teacher data are needed to make reasonable inferences about teacher performance.⁵⁶ As Thomas Kane and Douglas Staiger, Professor of Economics at Dartmouth College, illustrate in their 2001 paper, "Improving School Accountability Measures," in the context of measuring whole school performance, a substantial amount of randomness in estimated performance results simply from test measurement error or the luck of the draw in students.⁵⁷

As a result, small schools are far more likely than large schools to be classified as being either very effective or ineffective, but this classification is less likely to accurately identify the true effectiveness of these schools. Likewise, one would not want to inappropriately dole out teacher performance rewards based on what may only be a "statistical blip." All of the above concerns are methodologically challenging issues at the forefront of current teacher research.

While it is clear that policymakers are not waiting for these issues to be resolved prior to launching pay-for-performance experiments, it would probably be prudent to invest in research focused on these issues. One could easily imagine that identified mistakes made in judgments about teacher effectiveness, which in turn had consequences for the compensation of individual teachers, could seriously undermine policymakers wishing to push forward in this direction.

A final technical issue that arises is the question of the comparison group against which teachers are to be judged. There may well be political arguments for having a teacher evaluation and performance system at the local school district level—for instance, retaining local control over budgetary issues. But there are also strong arguments to be made

for basing the performance system on a broader comparison. Within-district teacher comparisons are by definition limited to those teachers in a given school district. This means a district could have teachers that it judges to be highly effective that are actually less effective than teachers in a broader comparison group, such as the state. Of course, the reverse is also true.

The issue of the comparison group is likely to be particularly problematic for small districts, as they will necessarily have few teachers on which to base their assessments of relative effectiveness.⁵⁸ This is particularly problematic if teachers are teaching in very different educational contexts (for example, when there are significant differences between schools in student ability), as it is hoped that a teacher performance assessment system would effectively parcel out the contribution that individual teachers make toward student achievement from that which is attributable to what students themselves bring to the educational table.

Of course, it is only possible to compare teachers to one another and utilize methodologies that accurately identify teacher effectiveness if states have data systems that link teachers to their students and track them over time. The lack of such data systems—only a few states (Florida, North Carolina, and Tennessee) currently have them—greatly limits the ability of states to create credible merit pay plans, and to study the effects of any type of teacher pay reform. It is therefore not surprising that the question of whether to establish a uniform teacher and/or student identification system, which would allow for teacher-student linkages, elicits considerable debate between advocates for and against teacher pay reform.

Union power

Advocates of teacher pay reforms often point to the major teachers unions—and the collective bargaining agreements negotiated with school districts—as a major impediment to reform. There is little doubt that these do in fact influence teacher pay policies. Dan Goldhaber and colleagues, for instance, find in “Why Do So Few Public School Districts Use Merit Pay?” that school districts that report having a collective bargaining agreement, as opposed to no formal agreement (and no “meet and confirm” arrangement), with a teachers union or organization are about half as likely to have merit pay plans: about 6 percent of districts with a collective bargaining agreement have merit pay versus about 11 percent for those without such an agreement.

Yet the two major teachers unions are not monolithic in their views. The larger of the two prominent teachers unions, the National Education Association, has generally taken a harder line against pay reform than the American Federation of Teachers.

The *2006 NEA Handbook* makes it clear that the NEA supports the use of salary schedules based on academic degrees, preparation, professional growth, and length of service. It specifically opposes pay for performance or additional compensation to attract or retain individuals for hard-to-recruit positions.⁵⁹

The NEA's opposition to pay reforms is more than purely institutional rhetoric. Prince, for example, in "The Case for Financial Incentives," describes a number of cases where local NEA affiliates blocked school districts from employing pay reforms designed to attract teachers to difficult-to-fill positions. Small districts in Nebraska and Missouri, for instance, were sued for attempting to pay signing bonuses to teachers in shortage areas. Such suits, if won by the union, can block districts outright from deviations from the single-salary schedule, but they also likely impede other school districts from attempting to implement alternatives for fear that they will end up engaged in a long and costly legal battle.

The American Federation of Teachers, in sharp contrast to the NEA, explicitly recognizes some of the shortcomings of the single-salary schedule, suggesting that it has "severe drawbacks" and "does not allow teachers to be compensated like other professionals in our society".⁶⁰ The AFT does not endorse specific reforms, but urges its local affiliates to explore alternative teacher evaluation and compensation systems, and explicitly states that alternatives could include "financial incentives to teachers who acquire additional knowledge and skills ... [increased pay for those] who agree to teach in low-performing and hard-to-staff schools... [or] increased pay for schoolwide improvement, mentoring new and veteran teachers and teaching in shortage areas."

In fact, Sandra Feldman, the former president of the AFT, openly suggested in her 2004 article, "Rethinking Teacher Compensation: Equitable Pay for Teachers is Part and Parcel of Improving Student Performance," that pay reforms could include both salary increases and rewards for "different roles, responsibilities, skills, and yes, results".

The views of the two teachers unions on pay reform are quite clear, but how well do these positions reflect the views of the teachers they represent? The distinction between union positions and the views of the teacher workforce is important. If teachers tend to recognize the labor market realities suggested by the AFT position on compensation, one could imagine a positive teacher response to reform. Of course, the political hurdle of implementing reform is likely to be far higher if the teacher workforce view on compensation is closer to that of the NEA position.

Specifically, teachers and teachers unions exercise a great deal of political power, particularly at the local level where the turnout of the electorate tends to be low.⁶¹ Politicians are quite unlikely to implement pay reforms that they know will cost them their jobs. Opinion polling suggests that the general public is far more favorably inclined toward teacher pay reform (performance-based pay at least) than are teachers.⁶² Given the outsized role that teachers unions can play in a local election, one can reasonably argue that lasting pay reforms are more likely when they emanate from a higher level of government.

Unfortunately, it's hard to gauge how teachers feel about many pay reform issues. Opinion surveys suggest that teacher responses are sensitive to subtleties in the ways that questions about reform are worded. A 2003 survey of public school teachers by Public Agenda, for instance, asked the very general question of whether or not school districts should deviate

from the single salary by providing teachers with financial rewards for things besides their years of experience and graduate credits. The response to this question suggests that teachers tend not to be very favorable to reform, as roughly half of the respondents thought any deviation from the current system would “open up a can of worms”.⁶³

Teachers, however, appeared to be much more favorably inclined to reforms when asked about specific compensation reforms. Around 70 percent of teachers supported providing incentives to teachers “who work in tough neighborhoods with low-performing schools,” and a similar percentage favored additional compensation for teachers “who consistently work harder, putting in more time and effort than other teachers.”

Yet there are also clear limits to what one would want to infer based on broad-based teacher responses—teachers’ context and experience appear to influence their attitudes. Ballou and Podgursky, for instance, find in their 1993 paper, “Teachers’ Attitudes toward Merit Pay: Examining Conventional Wisdom,” that teachers are more likely to be favorably inclined toward merit pay if they are teaching disadvantaged and low-achieving students, and/or have taught in a district that has used merit pay. Furthermore, teachers in such districts were more supportive regardless of whether they received a performance bonus themselves, suggesting that the existence of such incentives does not necessarily negatively affect educational climate.

Teachers and teachers unions clearly play a political role in influencing teacher compensation reform. But the politics of teacher pay reform is quite complicated; it’s wrong to lay the failure of most districts to adopt a reform agenda *solely*, and perhaps even primarily, at its feet. Union power in particular is not uniformly distributed throughout school systems in the country. In many school districts there are few direct constraints from using alternative compensation strategies. Were unions the primary inhibitor to reform we might expect these districts (without bargaining agreements) to be far more likely to implement reforms. They are, in fact, *somewhat* more likely to do so, but the proportion of school districts using alternative teacher compensation strategies in states and localities having a more free hand to do so is still small.

School district politics

That the single-salary schedule has withstood change is no doubt in part due to the influence of union power, but unions alone do not explain the reluctance to experiment with alternatives. Education reform of any sort involves the changing of school culture, and the role of culture is likely to be particularly salient in the case of compensation, as compensation policy is probably a more sensitive issue for employees than any other.

Teachers potentially play a powerful role in school district politics regardless of unionization levels. Thus, district officials may shun reforms such as pay-for-performance because they go against teacher preferences, but this is not the only political impediment to

compensation reform. Of particular interest is the fact that the great majority of districts do not differentially compensate teachers for differences in working conditions (so called “combat pay”), despite the fact that it would be straightforward to enact policies designed to directly address the inequity in the distribution of teacher qualifications, much of which is *within* school districts.⁶⁴

A 2005 paper by Marguerite Roza, Research Assistant Professor at the University of Washington, “Many a Slip ’tween Cup and Lip: District Fiscal Practices and Their Effect on School Spending,” illustrates that the inequitable distribution of teachers within districts leads to significant disparities in the per-pupil allocation of within-district resources. Roza, for example, estimates that one district spends \$2,900 more per pupil at one particular school than at another in the same district. It is, of course, possible that district officials and school board members are unaware of this inequity. Many of them, when determining school-based budgets, cost out teachers at the average price (a teacher’s salary), regardless of whether they are high-cost teachers with advanced degrees or more experience who tend to teach more affluent students, or lower-cost teachers, who tend to be teaching disadvantaged students.

The less-benign explanation, however, is that this inequitable distribution of teachers serves the political interests of school board members or other high-level district officials. Teacher distribution is, at least to some extent, a zero-sum game. Within a district, the teachers who are induced through pay incentives to teach in disadvantaged schools may well be leaving the district’s more advantaged schools. It is these advantaged schools that (given the strong correlation between income and the propensity to vote) are likely to have more politically active parent populations. And these parents are unlikely to be thrilled at the prospect of seeing their more-qualified teachers depart for other schools. As is often the case, those who benefit from the status quo are more politically active and mobilized than those who would benefit from changing it.

Local board members whose political survival is largely dependent on the preferences of public school parent constituencies may generally be unable to make such changes.⁶⁵ This line of reasoning implies that teacher compensation alternatives would be more likely to be implemented by officials—mayors or governors, for instance—who are accountable to broad constituencies and may actually have more at stake politically in the quality of *all* schools in a region such that their political survival is less dependent on the preferences of public school parents.

Institutional inertia

A final and not inconsiderable hurdle to implementation of teacher pay reforms is institutional inertia. Public institutions are, in general, resistant to change, due at least in part to their reliance on rules to guide decisions and the job protections afforded to their employees.⁶⁶ Part of the explanation for this is that public school central offices are populated by

former teachers used to doing things a certain way: the way it was done when they came through the system. The single-salary schedule is objective and easy to administer. It does not require year-to-year adjustments, as would any pay reform that sought to be responsive to market conditions or teacher performance. Nor does it evoke suspicion about the basis of pay or require any sophisticated statistical analysis to determine performance or appropriate pay levels.

Furthermore, successful implementation and sustainability of any new education policy is dicey. School systems wishing to implement pay reforms have shockingly little research that can be used to support the notion that such reforms would elicit beneficial behavioral responses from teachers. And in the absence of any empirical guidance, it is hard to make a strong case for a change that is bound to cause turbulence.

The bottom line is that implementing and employing the types of alternatives to the single-salary schedule is challenging from a practical perspective, and many districts likely do not have the institutional capacity—even if they do have the political flexibility—to move away from the safety of the single-salary schedule.

Conclusions and recommendations

This paper began with the argument that a gateway approach to improving teacher quality is both incremental, in that it only targets the flow of new teachers into the profession, and is not likely to be successful, because we don't know which potential teachers ought to be targeted. Rethinking how teachers are paid might be a more productive avenue of reform. The dichotomy between the structure of compensation in education and the way the broader labor market tends to reward employees provides compelling theoretical arguments for moving the teaching profession away from the single-salary schedule.

It is not implausible to surmise that individuals who can make substantially more money outside of the teaching profession are less likely to seek employment as teachers. Nor is it a surprise that, in the absence of pay differentials, teachers with more labor market bargaining power will tend to end up in more desirable schools and classrooms. Thus, the fact that teacher pay reform appears to be high on the policy agenda is likely a good thing: Not only are states and localities launching high-profile experiments with teacher compensation—often involving merit pay—but the federal government is clearly encouraging teacher pay reform through its Teacher Incentive Fund. This fund is a new program providing grants to states and school districts to help develop and implement innovative pay structures that reward teachers for increases in student achievement and increase the number of high-quality teachers in hard-to-staff positions teaching disadvantaged students.⁶⁷

Pay reforms have not taken hold in most school districts, even those with a significant amount of flexibility to experiment. The reasons are simultaneously complex (because of the technical challenges of measuring teacher performance) and simple (due to union power), but all argue that reform efforts likely need to be at the state rather than the local level. From a practical standpoint, it is much more likely that the state will have the capacity to develop data and analysis systems that can credibly be used to assess significant areas of shortage, track teacher performance, and/or administer a differentiated pay system.

And from a political perspective, it may be necessary to get to the state level in order to buffer some of the negative local political consequences arising from various pay reforms. In addition to suggesting that pay reforms are more likely to take hold when implemented at the state level, following are recommendations for those who wish to see teacher pay reforms successfully implemented:

- **Teacher pay reform is much more likely to be successful if the reform takes place at the state level.** States, unlike most localities, have the capacity to develop data and analysis systems that can credibly be used to assess significant areas of shortage, track teacher performance, and/or administer a differentiated pay system. And from a political perspective, it may be necessary to get to the state level in order to buffer some of the negative local political consequences arising from various pay reforms.
- **States must make basic investments in their education data infrastructures.** Relatively few states have databases that permit the linkage of teachers to their students and the tracking of both over time. Much of what we now know about teacher quality has been learned from analyses of these states, as in the forthcoming paper by Dan Goldhaber and Michael DeArmond, and this type of data structure is really a prerequisite for assessing teacher effectiveness (in the context of determining merit pay policies) or for analyzing the efficacy of state policies (when considering combat pay policies like the one Charles Clotfelter and his colleagues investigate).
- **More basic research is needed on the data and methodological requirements for using student achievement tests as a gauge of teacher effectiveness.** Research has clearly demonstrated that it is no simple task to isolate teachers' contributions toward student achievement or to know how much student and teacher data is necessary in order to make strong inferences about the differences in performance between teachers.⁶⁸ Mistakes about teacher performance carry particularly high stakes when performance is linked to teacher pay, and any such errors would seriously undermine political support for compensation reforms—and could even lead to legal action.
- **States and localities need to engage in a number of pay experiments.** Furthermore, there must be independent evaluation of these experiments as opposed to evaluation by individuals or organizations having a stake in the outcome. So few pay reforms have been analyzed to date that we have very little information about the efficacy of any particular reform structures.

Pay is certainly not the only way to manage a workforce, but it is one of the primary policy tools that school systems have at their disposal. The strict adherence to the traditional single-salary schedule therefore strips school districts of a key managerial tool. Even though the research on teacher compensation reform is hardly definitive enough to recommend the use of specific pay reforms to reach specific goals, the few quantitative studies that do exist suggest that a more strategic use of teacher compensation could lead to both a more equitable allocation of teachers among students and increased student achievement.

References

- Aaronson, D., Barrow L., and Sander, W. (2003). "Teachers and Student Achievement in the Chicago Public High Schools." Working Paper 2002-28, Federal Reserve Bank of Chicago: Chicago, IL.
- Antos, J. R. and Rosen, S. (1975). "Discrimination in the Market for Public School Teachers." *Journal of Econometrics* 3, 123-150.
- Bachrah, Peter and Baratz, Morton S. (1962) "The Two Faces of Power" *American Political Science Review*, 56:4 947-52
- Ballou, D. (2001). "Pay for Performance in Public and Private Schools." *Economics of Education Review* 20(1), 51-61.
- Ballou, D. and Podgursky, M. (1993). "Teachers' Attitudes toward Merit Pay: Examining Conventional Wisdom." *Industrial and Labor Relations Review* 47(1), 50-61.
- Ballou, D. and Podgursky, M. (1997). *Teacher Pay and Teacher Quality*. W. E. Upjohn Institute for Employment Research: Kalamazoo, MI.
- Ballou, D., Sanders, W., and Wright, P. (2004). "Controlling for Student Background in Value-Added Assessment of Teachers." *Journal of Educational and Behavioral Statistics* 29(1), 37-66.
- Baugh, W. H. and Stone, J. A. (1982). "Teachers, Unions, and Wages in the 1970s: Unionism Now Pays." *Industrial and Labor Relations Review* 35(3), 368-76.
- Berger, M. C. (1988). "Predicted Future Earnings and Choice of College Major." *Industrial and Labor Relations Review* 41(3), 418-29.
- Betts, J. R., Rueben, K. S., and Danenberg, A. (2000). "Equal Resources, Equal Outcomes? The Distribution of School Resources and Student Achievement in California." Public Policy Institute of California: San Francisco, CA.
- Boe, E.E. and Gilford, D.M., Eds. (1992). *Teacher Supply, Demand, and Quality: Policy Issues, Models, and Data Bases: Proceedings of a Conference*. National Academy Press: Washington, D.C.
- Bretz, R. and Milkovich, G. (1989). *Performance Appraisal in large Organizations: Practice and Research Implications*. Cornell University: Ithaca, NY.
- Brewer, D. J., Eide, E. R., and Ehrenberg, R. G. (1999). "Does It Pay to Attend an Elite Private College? Cross-Cohort Evidence on the Effects of College Type on Earnings." *The Journal of Human Resources*, 34(1), 104-23.
- Brown, C. (1990). "Firms Choice of Method of Pay." *Industrial and Labor Relations Review*, 43(3), 165S-182S.
- Campbell, L. (2006). "Iowa Takes Second Shot at Merit Pay." *Des Moines Register* retrieved from: <http://desmoines-register.com/apps/pbcs.dll/article?AID=/20060904/NEWS02/609040345/1004>. Retrieval date: September 2006.
- Cavalluzzo, L. C. (2004). "Is National Board Certification an Effective Signal of Teacher Quality?" The CNA Corporation.
- Chambers, J. and Fowler, Jr. W. J. (1995). "Public School Teacher Cost Differences Across the United States." NCES 95-758. U. S. Department of Education, National Center for Education Statistics: Washington, D. C.
- Clotfelter, C. T. and Ladd, H. F. (1996). "Recognizing and Rewarding Success in Public Schools." In: Ladd, H. F. (ed.) *Holding Schools Accountable: Performance-Based Reform in Education*. Brookings Institution Press: Washington, D. C., 23-64.
- Clotfelter, C. T., Ladd, H. F., and Vigdor, J. (forthcoming). "Teacher Sorting, Teacher Shopping, and the Assessment of Teacher Effectiveness." *Journal of Human Resources*.
- Clotfelter, C. T., Glennie, E., Ladd, H. F., and Vigdor, J. (2006). "Would Higher Salaries Keep Teachers in High-Poverty Schools? Evidence from a Policy Intervention in North Carolina." NBER Working Paper, no. 12285.
- Corcoran, S., Evans, W.N., and Schwab, R. (2004). "Women, the Labor Market, and the Declining Relative Quality of Teachers." *Journal of Policy Analysis and Management* 23(3), 449-70.
- Dee, T. S. and Keys, B. (2004). "Does Merit Pay Reward Good Teachers? Evidence from a Randomized Experiment." *Journal of Policy Analysis and Management* 23(3), 471-88.

- Denver Public Schools. (2006). ProComp: Professional Compensation System for Teachers information retrieved from: <http://www.dpsk12.org/manila/programs/denverprocomp/procomp-chart2005v3.pdf>. Retrieval date: August 2006.
- Dixit, A. (2002). "Incentives and Organizations in the Public Sector: An Interpretative Review." *Journal of Human Resources* 37(4), 696-727.
- Dolton, P., Makepeace, G., and van der Klaauw, W. (1989). "Occupational Choice and Earnings Determination – The Role of Sample Selection and Non-Pecuniary Factors." *Oxford Economic Papers* 41(3), 573-94.
- Ehrenberg, R. G. and Brewer, D. J. (1995). "Did Teachers' Verbal Ability and Race Matter in the 1960s? Coleman Revisited." *Economics of Education Review* 14(1), 1-21.
- Feldman, S. (2004). "Rethinking Teacher Compensation: Equitable Pay for Teachers is Part and Parcel of Improving Student Performance." *American Teacher* 88(6), 5.
- Ferguson, R. (1991). "Paying for Public Education – New Evidence on How and Why Money Matters." *Harvard Journal on Legislation* 28(2), 465-98.
- Ferguson, R. (1998). "Teachers' Perceptions and Expectations and the Black-White Test Score Gap." In: Jencks, C. and Phillips, M. (eds.) *The Black-White Test Score Gap*. Brookings Institution Press: Washington, D.C., 273-317.
- Ferguson, R. and Ladd, H. (1996). "How and Why Money Matters: An Analysis of Alabama Schools." In: Ladd, H. (ed.) *Holding Schools Accountable: Performance-Based Reform in Education*. Brookings Institution Press: Washington, D. C.
- Figlio, D. and Kenny, L. (2006). "Do Individual Teacher Incentives Boost Student Performance?" Working Paper.
- Freeman, R. B. (1976). "A Cobweb Model of the Supply and Starting Salary of New Engineers." *Industrial and Labor Relations Review* 29(2), 236-48.
- Goldhaber, D. (2002). "Teacher Quality and Teacher Pay Structure: What Do We Know, and What are the Options?" *The Georgetown Public Policy Review* 7(2), 81-93.
- Goldhaber, D. (2006a). "Everyone's Doing It, but What Does Teacher Testing Tell Us About Teacher Effectiveness?" Working Paper.
- Goldhaber, D. (2006b). "National Board Teachers Are More Effective, but Are They in the Classrooms Where They're Needed the Most?" *Education Finance and Policy* 1(3).
- Goldhaber, D. and Liu, A. (2003). "Occupational Choices and the Academic Proficiency of the Teacher Workforce." In: Fowler, W. (ed.) *Developments in School Finance 2001–02*. National Center for Education Statistics: Washington, D. C., 53-75.
- Goldhaber, D. and Anthony, E. (forthcoming). "Can Teacher Quality be Effectively Assessed? National Board Certification as a signal of Effective Teaching." *Review of Economics and Statistics*.
- Goldhaber, D. and DeArmond, M. (Forthcoming). "Teacher Characteristics, Workforce Policies, and the Search for Teacher Quality: Implications for Research and Data." Prepared for the National Center on Education Statistics Teacher Supply and Demand Symposium, January 2007.
- Goldhaber, D., Brewer D. J., and Anderson D. (1999). "A Three-way Error Components Analysis of Educational Productivity." *Education Economics* 7(3), 199-208.
- Goldhaber, D., Choi, H. J., DeArmond, M., and Player, D. (2006). "Why Do So Few Public School Districts Use Merit Pay?" Working Paper.
- Gordon, R., Kane, T., and Staiger, D., (2006). "Identifying Effective Teachers Using Performance on the Job." Hamilton Project White Paper 2006-01.
- Greenberg, D. and McCall, J., (1974). "Teacher Mobility and Allocation." *Journal of Human Resources* 9(4), 480-502.
- Grogger, J. and Eide, E. (1995). "Changes in College Skills and the Rise in the College Wage Premium." *The Journal of Human Resources* 30(2), 280-310.
- Hansen, D. (1997). "Worker Performance and Group Incentives: A Case Study." *Industrial and Labor Relations Review* 51(1), 37-49.
- Hanushek, E. A. (1986). "The Economics of Schooling – Production and Efficiency in Public Schools." *Journal of Economic Literature* 24(3), 1141-78.
- Hanushek, E. A. (1992). "The Trade-off between Child Quantity and Quality." *Journal of Political Economy* 100(1), 84-117.
- Hanushek, E. A., Kain, J. F., and Rivkin, S. G. (2004). "Why Public Schools Lose Teachers." *Journal of Human Resources* 39(2), 326-54.
- Hanushek, E. A., Kain, J. F., and Rivkin, S. G. (2005). "Teachers, Schools, and Academic Achievement." *Econometrica* 73(2), 417-58.
- Hanushek, E. A., Kain, J. F., Markman, J. M., and Rivkin, S. G. (2003). "Does Peer Ability affect Student Achievement?" *Journal of Applied Econometrics* 18(5), 527-44.
- Hanushek, E. A. and Pace, R. R. (1995). "Who Chooses to Teach (and Why)?" *Economics of Education Review* 14(2), 101-17.
- Hare, D., Nathan, J., and Darland, J. (2000). "Teacher Shortages in the Midwest: Current Trends and Future Issues." University of Minnesota, Center for School Change: Minneapolis, MN.

- Harrington, P. (2001). "Attracting New Teachers Requires Changing Old Rules." *The College Board Review* 192, 6-11.
- Hassle, B. (2002). "Better Pay for Better Teachers: Making Teacher Compensation Pay Off in the Age of Accountability." Progressive Policy Institute 21st Century Schools Project Report.
- Hatry, H., Greiner, J.M., and Ashford, B.G. (1994). *Issues and Case Studies in Teacher Incentive Plans*. The Urban Institute Press: Washington, D. C.
- Henke, R., Chen, X., and Geis, S. (2000). "Progress Through the Teacher Pipeline: 1992-93 College Graduates and Elementary/Secondary School Teaching as of 1997." NCES 2000-152. U. S. Department of Education, National Center for Education Statistics: Washington, D. C.
- Henke, R., Geis, S., and Giambattista, J. (1996). "Out of the Lecture Hall and into the Classroom: 1992-93 College Graduates and Elementary/Secondary School Teaching." NCES 96-899. U. S. Department of Education, National Center for Education Statistics: Washington, D. C.
- Hoff, D. J. (2005). "Governors Seek New Teacher Pay Methods: Plans Include Merit Pay, Bonuses for Teaching in Struggling Schools." *Education Week* 24(21), 22-8.
- Hoxby, C.M. and Leigh, A. (2004). "Pulled Away or Pushed Out? Explaining the Decline of Teacher Aptitude in the United States." *American Economic Review* 94(2), 236-40.
- Hoxby, C.M. and Leigh, A. (2005). "Wage Distortion: Why America's Top Female College Graduates Aren't Teaching. (Research)." *Education Next*, 5(2), 50-6.
- Jacob, B. and Lefgren, L. (2005). "Principals as Agents: Subjective Performance Measurement in Education." NBER Working Paper, no. 11124.
- Jacob, B. and Lefgren, L. (2006). "When Principals Rate Teachers: The Best – and Worst– Stand Out." *Education Next* 6(2), 58-64.
- Kain, J. F. and Singleton, K. (1996). "Equality of Educational Opportunity Revisited." *New England Economic Review* May-June 1996, 87-110.
- Kam, D. (2002). "Education Board Secretary Pushes Merit-Based Teacher Pay." *Florida Capital News* retrieved from: <http://www.floridacapitalnews.com/legislature/stories/020402teachers.htm>. Retrieval date: September 2006.
- Kane, T. J., Rockoff, J. E., and Staiger, D. (2006). "What Does Teacher Certification Tell Us About Teacher Effectiveness? Evidence from New York City." Working Paper.
- Kane, T. J. and Staiger, D. (2001). "Improving School Accountability Measures." NBER working paper, no. 8156.
- Kaufman, H. (1971). *The Limits of Organizational Change*. Tusaloosa, AL: University of Alabama Press.
- Keller, M. (2006). "A Costly Lesson in Supply and Demand." *Los Angeles Times*, July 17, 2006. Retrieved from <http://www.latimes.com/business/careers/work/la-memath17jul17,1,319923.story?coll=la-headlines-business-careers>. Retrieval date: August 2006.
- Kirby, S. N., Berends, M., and Naftel, S. (1999). "Supply and Demand of Minority Teachers in Texas: Problems and Prospects." *Educational Evaluations and Policy Analysis* 21(1), 47-66.
- Klein, S. P., and Hamilton, L. S. (1999). *Large-Scale Testing: Current Practices and New Directions*. RAND Corporation: Santa Monica, CA.
- Koedel, C. and Betts, J. (2005). "Reexamining the Role of Teacher Quality in the Educational Production Function," Working Paper. University of California San Diego.
- Koretz, D. M. (2002). "Limitations in the Use of Achievement Tests as Measures of Educators' Productivity." *The Journal of Human Resources* 37(4), 752-77.
- Lakdawalla, D. (2002). "Quantity over Quality: Ever-Declining Class Sizes and Teachers' Dwindling Pay have a Common Explanation: the Increasing Price of Skilled Labor. (Research)." *Education Next* 2(3), 66-72.
- Lankford, H., Loeb, S., and Wyckoff, J. (2002). "Teacher Sorting and the Plight of Urban Schools: A Descriptive Analysis." *Education Evaluation and Policy Analysis* 24, 37-62.
- Lavy, V. (2002). "Evaluating the Effect of Teachers' Group Performance Incentives on Pupil Achievement." *Journal of Political Economy* 110(6), 1286-1316.
- Lazear, E. (1996). "Performance Pay and Productivity." NBER Working Paper no. 5672.
- Levinson, A. (1988). "Reexamining Teacher Preferences and Compensating Wages." *Economics of Education Review* 7(3), 357-64.
- Loeb, S. (2000). "How Teachers' Choices Affect What a Dollar Can Buy: Wages and Quality in K-12 Schooling." Working paper. Stanford University: CA.
- Louisiana Department of Education (2006). National Board Certification Incentive Information retrieved from: <http://www.doe.state.la.us/1de/pd/626.html>. Retrieval date: August 2006.
- McCaffrey, D., Koretz, D., Lockwood, J., and Hamilton, L. (2004). "Evaluating Value-Added Models for Teacher Accountability." RAND Corporation: Santa Monica, CA.
- Meyer, R. (1997). "Value-Added Indicators of School Performance: A Primer." *Economics of Education Review* 16(3), 283-301.

- Milanowski, A. (2003). "The Varieties of Knowledge and Skill-Based Pay Design: A Comparison of Seven New Pay Systems for K-12 Teachers." *Education Policy Analysis Archives* 11(4).
- Milkovich, G., and Wigdor, A., eds. (1991). *Pay for Performance: Evaluating Performance Appraisal and Merit Pay*. National Academy Press: Washington, D.C.
- Mitchell, D. J. B., Lewin, D., and Lawler, E. E. (1990). "Alternative Pay Systems, Firm Performance, and Productivity." In Blinder, A. (ed.) *Paying for Productivity: A Look at the Evidence* Brookings Institution Press: Washington, D.C.
- Moe, T. M. (2005). "Teacher Unions and School Board Elections." In *Besieged: School Boards and the Future of Education Politics*. Brookings Institution Press: Washington, D.C.
- Moe, T. M. (2006). "The Union Label on the Ballot Box." *Education Next* 6(3), 58-67.
- Murnane, R. J. (1981). "Teacher Mobility Revisited." *The Journal of Human Resources* 16(1), 3-19.
- Murnane, R. J. and Cohen, D. K. (1986). "Merit Pay and the Evaluation Problem: Why Most Merit Pay Plans Fail and Few Survive." *Harvard Educational Review* 56(1), 1-17.
- Murnane, R. J., Singer, J. D., Willett, J. B., Kemple, J., and Olsen, R. (1991). *Who Will Teach?* Harvard University Press: Cambridge, MA.
- Murnane, R. J., Willett, J. B. and Levy, F. (1995). "The Growing Importance of Cognitive Skills in Wage Determination." *The Review of Economics and Statistics* 77(2), 251-66.
- National Commission on Excellence in Education. (1983). "A Nation at Risk: The Imperative for Educational Reform." U.S. Department of Education: Washington, D.C.
- National Education Association. (2006). *The 2006 NEA Handbook*. Salary information retrieved from: <http://www.nea.org/handbook/index.html>. Retrieval date: August 2006.
- Odden, A. and Kelley, C. (1997). *Paying Teachers for What They Know and Do: New and Smarter Compensation Strategies to Improve Schools*. Corwin Press, Inc.: Thousand Oaks, CA.
- Pencavel, J. (1977). "Work, Effort, On-the-Job Screening, and Alternative Methods of Remuneration." *Research in Labor Economics* 1.
- Perrow, C. (1981) *Complex Organizations*. 3rd ed. New York: McGraw-Hill.
- Peterson, K. (2006). "Teacher Pay Reform Challenges States." *State-line.org* retrieved from: <http://www.stateline.org/live/ViewPage.action?siteNodeId=136&languageId=1&contentId=93346>. Retrieval date: September 2006.
- Podgursky, M. (2001). "Regulation versus Markets: The Case for Greater Flexibility in the Market for Public School Teachers." pp. 117-48. In: Wang, M. C. and Walberg, H. J. (eds.), *Tomorrow's Teachers*.
- Podgursky, M. (2003). "Fringe Benefits: There is More to Compensation than a Teacher's Salary," *Education Next* 3(3), 71-6.
- Prendergast, C. (1999). "The Provision of Incentives in Firms." *Journal of Economic Literature* 37(1), 7-63.
- Prince, C. D. (2002). "The Case for Financial Incentives." American Association of School Administrators.
- Public Agenda. (2000). "A Sense of Calling: Who Teaches and Why?" Teacher Salary Opinions retrieved from: <http://www.publicagenda.com/specials/teachers/teachers3.htm>. Retrieval date: August 2006.
- Public Agenda. (2003). "Stand by Me: What Teachers Really Think about Unions, Merit Pay and Other Professional Matters." Public Agenda: New York, NY.
- Reichardt, R. and Van Buhler, R. (2003). "Recruiting and Retaining Teachers with Alternative Pay." *Mid-continent Research for Education and Learning*: Aurora, CO.
- Rockoff, J. E. (2004). "The Impact of Individual Teachers on Students' Achievement: Evidence from Panel Data." *American Economic Review* 94(2), 247-52.
- Roza, M. (2005). "Many a Slip 'tween Cup and Lip: District Fiscal Practices and Their Effect on School Spending." Prepared for The Aspen Institute Congressional Program: *The Challenge of Education Reform: Standards, Accountability, Resources and Policy*.
- Sanders, W. L., Ashton, J. J., and Wright, S. P. (2005). "Comparison of the Effects of NBPTS Certified Teachers with Other Teachers on the Rate of Student Academic Progress." Retrieved from www.nbpts.org/research/archive_3.cfm?id=162.
- Sanders, W. L. and Rivers, J. (1996). "Cumulative and Residual Effects of Teachers on Future Student Academic Achievement." Research Progress Report, University of Tennessee, Value-Added Research and Assessment Center: Knoxville, TN.
- Shields, P. M. et al. (1999). "The Status of the Teaching Profession 1999." The Center for the Future of Teaching and Learning: Santa Cruz, CA.
- Snipes, J. C., Quint, J. C., Rappaport, S., and Schofield, L. S. (2006). "Doing What Counts." MDRC.
- Stinebricker, T. R. (2001). "A Dynamic Model of Teacher Labor Supply." *Journal of Labor Economics* 19(1), 196-230.
- Strauss, R. and Sawyer, E. (1986). "Some New Evidence on Teacher and Student Competencies." *Economics of Education Review* 5(1), 41-8.

- Teacher Advancement Program (2006). Performance-based Compensation Information retrieved from: <http://www.tapschools.org/about.taf?page=element4>. Retrieval date: August 2006.
- The Teaching Commission (2006). "Teaching at Risk: Progress & Potholes." The National Council on Teacher Quality: New York, NY.
- Texas Association of School Boards (2006). "Houston ISD Takes Center Stage by Approving Teacher Performance Pay". Retrieved from http://www.tasb.org/services/hr_services/hrx/vol12/no4/hisd.html. Retrieval date: August 2006.
- Todd, P. E. and Wolpin, K. I. (2004). "The Production of Cognitive Achievement in Children: Home, School and Racial Test Score Gaps." Working Paper.
- Useem, E. and Farley, E. (2004) "Philadelphia's Teacher Hiring and School Assignment Practices: Comparisons with Other Districts," Research for Action. Retrieved from: www.researchforaction.org/PSR/PublishedWorks/TQTHC042204.pdf Retrieval date: August 2006.
- Vandevoort, L. G. et al. (2004). "National Board Certified Teachers and Their Students' Achievement." *Education Policy Analysis Archives* 12(46).
- Weitzman, M. L. and Kruse, D. L. (1990). "Profit Sharing and Productivity." In: Blinder, A. (ed.), *Paying for Productivity: A Look at the Evidence* Brookings Institution Press: Washington, D.C.
- Wright, P., Horn, S., and Sanders, W. (1997). "Teachers and Classroom Heterogeneity: Their Effects on Educational Outcomes." *Journal of Personnel Evaluation in Education* 11(1), 57-67.

Endnotes

- 1 See Hanushek (1992). Also, see work by Sanders and Rivers (1996), who find that students having a sequence of three consecutive teachers who fall into the highest quintile group score between 52-54 percentile points higher in the achievement distribution than those who have three consecutive teachers who fall into the lowest quintile.
- 2 See Goldhaber et al. (1999) or Hanushek et al. (2005).
- 3 I use the terms “teacher quality,” “teacher performance,” and “teacher effectiveness” interchangeably.
- 4 The finding that measured teacher performance varies considerably in the workforce has been widely documented (Aaranson et al., 2003; Ballou et al., 2004; Koedel and Betts, 2005; Hanushek et al., 2004; Kane et al., 2006; Rockoff, 2004; Sanders and Rivers, 1996; Wright et al., 1997).
- 5 See Boe and Gilford, 1992.
- 6 For example, see Goldhaber (2006a) for a similar finding on teacher performance on licensure exams, Goldhaber (2006b) and Sanders et al. (2005) for differences between teachers with and without NBPTS certification, and Kane and Staiger (2001) for differences between teachers within individual schools.
- 7 Even if we did know how to determine which teacher candidates ought to be admitted into the profession, gateway policies would do little in the short term to change the quality of the teacher workforce, as they only would directly impact the flow of teachers and not those who are already employed.
- 8 This is a suggestion that has been made by a number of researchers (Ballou and Podgursky, 1997; Gordon et al., 2006; Hanushek et al., 2003).
- 9 It’s worth noting that most school districts do not distinguish between degrees in different specialty areas—a master’s degree is a master’s degree regardless of the subject area.
- 10 See Bretz and Milkovich, 1989, and Milkovich and Wigdor, 1991.
- 11 See Murnane et al., 1995, and Brewer et al., 1999.
- 12 See Grogger and Eide, 1995; Freeman, 1976; and Podgursky, 2001. For example, corporate lawyers typically earn more than public-interest lawyers, and military service members receive additional compensation for hazardous duty.
- 13 This is based on salaries that are not adjusted for the typical number of days worked in a year, which is generally less for teachers. For details on the debate about how teacher salaries compare with those in other occupations, see Corcoran et al. (2004) and Podgursky (2003).
- 14 These results are based on calculations from the *Baccalaureate and Beyond Longitudinal Study*, which is a national sample following a cohort of 1993 college graduates with follow-up surveys in 1994, 1997, and 2003. Technical major is defined as engineering, biological sciences, or mathematics and other sciences. All other majors (including education) were aggregated into the “Non-Technical” major category.
- 15 See Hare et al. 2000; Harrington 2001; and Shields et al. 2001.
- 16 Calculations are again from the *Baccalaureate and Beyond*. Where applicable, subjects’ ACT scores were converted to SAT scores.
- 17 The average differences in compensation between teachers and non-teachers with particular characteristics likely overstate the true implications of the single salary on the opportunity cost of becoming a teacher. The reason is that individuals choose their occupation so some of the differential in observed salaries is likely caused by differences between individuals (as opposed to pay structure). However, research that attempts to account for individual selection into occupation or major still finds significantly higher opportunity costs associated with teaching for higher-scoring college graduates and/or those with technical backgrounds (Berger, 1988; Goldhaber and Liu, 2003).
- 18 See Corcoran et al., 2004; Goldhaber and Liu, 2003; Hanushek and Pace, 1995; Henke et al., 1996; Hoxby and Leigh, 2004; and Lakdawalla, 2002.
- 19 Similar differences in attrition by specialty were also observed in an investigation of North Carolina teachers.
- 20 See Clotfelter et al., forthcoming; Corcoran et al., 2004; Ehrenberg and Brewer, 1995; Ferguson 1991, 1998; Ferguson and Ladd, 1996; Goldhaber, 2002, 2006b; Hanushek, 1986; Hoxby and Leigh, 2005; Lakdawalla, 2002; and Strauss and Sawyer, 1986.
- 21 They make the case that wage compression in teaching is due to the spread of unionization among teachers.
- 22 See Baugh and Stone, 1982; Dolton et al., 1989; Greenberg and McCall, 1974; Kirby et al., 1999; Murnane, 1981; Murnane et al., 1991; Shields et al., 1999; and Stinebricker, 2001.
- 23 Interestingly, they also find that minority teachers are more sensitive to changes in compensation.
- 24 Researchers can draw implications about how much teachers value certain aspects of jobs – the academic preparedness of students for instance – based on the salaries districts offer in an attempt to make a job attractive as well the decisions that teachers make when they move from one teaching job to another. This helps to ballpark the magnitude of a salary differential that would be necessary to entice teachers to accept teaching assignments in schools with varying working conditions. A significant amount of research (Hanushek et al., 2004; Lankford et al., 2002; Levinson, 1988; Loeb, 2000; Antos and Rosen, 1975) suggests that teachers care a great deal about the demographics of the students they are teaching, though it is important to note that these demographics may be proxying for other aspects of the job that are less evident in the data, such as how disruptive classrooms in a school tend to be.
- 25 See Betts et al., 2000; Kain and Singleton, 1996; Lankford et al., 2002; and Loeb, 2000.
- 26 The preferences that teachers hold about educational settings (e.g., the type of students enrolled in a school) are reflected in their job choices and can be used to estimate, in dollar terms, the value that teachers place, for instance, on teaching more-advantaged students. Levinson (1988), for example, estimates that for first-year teachers in Michigan in 1970, the compensating differential for teaching in the least-white school district as opposed to the most-white school district was about \$500 per teacher. Chambers and Fowler (1995) note that any estimation that tries to obtain an amount of the premium that teachers require to teach in schools with high nonwhite student populations will be hard-pressed to disentangle the effects of discrimination from variables such as urbanicity of the district and recent local population growth. Hanushek et al. (2004) attempt to resolve this issue by estimating a model that incorporates the ability of teachers to “switch” from one district to another and find that “a school with 10 percent more black students would require about 10 percent higher salaries in order to neutralize the increased probability of leaving.”
- 27 This figure accounts for lack of salary differentiation based on NBPTS certification, excellence in teaching, in-service professional development, teaching in a less desirable location, and teaching in fields of shortage. If we ignore in-service professional development, this number increases to about 85%.
- 28 See Clotfelter and Ladd, 1996.
- 29 See Odden and Kelley, 1997

- 30 See Hatry et al., 1994, and Murnane and Cohen, 1986. A number of states and school districts also experimented with non-salary “career ladder” type rewards for performance that provide high-performing teachers opportunities to participate in more professional development activities (Odden and Kelley, 1997).
- 31 Details of Denver’s “ProComp” plan can be found at: <http://www.dpsk12.org/manila/programs/denverprocomp/procompchart2005v3.pdf>
- 32 For more details on HISD’s merit pay plan, visit: http://www.tasb.org/services/hr_services/hrx/vol12/no4/hisd.html
- 33 See Reichardt and Van Buhler, 2003.
- 34 Details on this program and participating schools can be found at: <http://www.tapschools.org/about.taf?page=element4>.
- 35 See Dixit, 2002; Murnane and Cohen, 1986; and Prendergast, 1999.
- 36 See Clotfelter and Ladd, 1996; Figlio and Kenny, 2006; and Lavy, 2002.
- 37 The teacher incentive program directly targeted teachers by earmarking \$1.44 million annually for disbursement to winning schools in the form of merit pay and upgrades to general working conditions. The participating schools were ranked in terms of various measures of scholastic achievement and dropout rates, and only schools in the top third received awards. The school resources intervention, on the other hand, was designed to give the participating schools control over the disbursement of funds from a pool of \$1.2 million. The Ministry selected 22 schools out of 75 applicants, and each school received teacher time vouchers equivalent to 2.5 additional full-time teachers that were used to add teachers, reduce the student to faculty ratio, or provide additional help to weak students.
- 38 It should be noted that this is a small increase given an average test score (where test score is really a sum of test scores in several subjects) of 144 with a standard deviation of 33 points. However, the effect of merit pay is larger than class size, base salary, or school size in the authors’ regressions.
- 39 Unlike merit pay, which attempts to link compensation rewards directly to student achievement, pay for knowledge and skills seeks to link rewards to characteristics that are thought to be correlated with teacher effectiveness (Odden and Kelly, 1997).
- 40 More details can be found at: <http://www.doe.state.la.us/lde/pd/626.html>
- 41 See Cavalluzzo, 2004; Goldhaber and Anthony, forthcoming; and Vandervoort et al., 2004.
- 42 See Sanders et al., 2005.
- 43 See Public Agenda, 2000. Details on the survey and additional results can be found at: <http://www.publicagenda.com/specials/teachers/teachers.htm>
- 44 Some school districts also place teachers in high-demand areas on a higher step on the salary schedule. See Prince (2002) for a review of the various teacher incentives that have been employed recently.
- 45 See Prince, 2002. Housing incentives – such as relocation assistance, reduced rent, and home loans – have also been used to attract teachers with critical skills or entice them to teach in difficult schools.
- 46 This is based on weighted responses to the question: “Does this district currently use any pay incentives to recruit or retain teachers to teach in fields of shortage?” Surprisingly, there appears to be no quantitative studies that have estimated the impact of a program specifically targeting teachers with critical skills.
- 47 See Useem and Farley, 2004.
- 48 This is based on the weighted responses to the question: “Does this district currently use any pay incentives such as cash bonuses, salary increases, or different steps on the salary schedule to recruit or retain teachers to teach in a less desirable location?”
- 49 For example, Hassle, 2002 and Prince, 2002.
- 50 However, they also suggest that there may have been additional information asymmetries as seen when the state legislature abruptly cancelled the program in 2004.
- 51 However, as I discuss in greater detail in the following section, these problems are not impossible to overcome: merit pay is far more prevalent in private schools (Ballou and Podgursky, 1997), which obviously share many commonalities of context with schools in the public sector.
- 52 See Ballou and Podgursky, 1997.
- 53 See Kam (2002), Campbell (2006), and Peterson (2006) for more information about these pieces of legislation.
- 54 For example, Ballou et al., 2004 and McCaffrey et al., 2004.
- 55 See Klein and Hamilton, 1999; Todd and Wolpin, 2004; and Koretz, 2002.
- 56 Or the implications of teachers having small classes, and consequently few students, on which to base estimates of their effectiveness.
- 57 See, for instance, Aaronson et al. (2002), Ballou et al. (2004), Koedel and Betts (2005), and Rockoff (2004) as recent studies that focus on this issue in the context of measuring teacher performance.
- 58 According to the U.S. Department of Education’s 2005 Digest of Education Statistics (http://nces.ed.gov/programs/digest/d05_tf.asp), there are just over 3 million public school teachers employed in roughly 14 thousand school districts, which means the average number of teachers per district is about 220.
- 59 A notable exception to the NEA’s strict adherence to the single-salary schedule is that it supports additional compensation for teachers with NBPTS certification (NEA, 2006).
- 60 See <http://www.aft.org/topics/teacher-quality/comp.htm> for details on the AFT statement on professional compensation for teachers.
- 61 See Moe, 2005; 2006.
- 62 The poll finds that roughly two-thirds of the general public favors raising teacher pay if it is tied to performance versus only about a third of teachers who hold this position (The Teaching Commission, 2005).
- 63 See Public Agenda, 2003, p. 25.
- 64 See Lankford et al., 2002, and Roza, 2005. This is particularly noteworthy given that, at least at one point, neither the AFT nor the NEA objected to providing incentives for teachers to teach in disadvantaged schools (Prince, 2002).
- 65 This argument would of course apply to any officials, such as the superintendent, whose employment is primarily subject to the political considerations of public school parents.
- 66 See Bachrah and Baratz, 1962; Kaufman 1971; and Perrow, 1981.
- 67 For more on this program, see <http://www.ed.gov/programs/teacherincentive/faq.html>.
- 68 See Ballou et al., 2004; McCaffrey et al., 2004; Todd and Wolpin, 2004.

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