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Teacher Incentive Pay Programs in the United States: Union Influence and District Characteristics

Guodong Liang, *Community Training and Assistance Center*
Ying Zhang, *University of Maryland*
Haigen Huang, *University of Missouri*
Zhaogang Qiao, *Community Training and Assistance Center*

Abstract This study examined the characteristics of teacher incentive pay programs in the United States. Using the 2007–08 SASS data set, it found an inverse relationship between union influence and districts' incentive pay offerings. Large and ethnically diverse districts in urban areas that did not meet the requirements for Adequate Yearly Progress as defined under the *No Child Left Behind Act* are more likely to offer a larger number of economic incentives. Although rural districts are likely to reward teachers in hard-to-staff schools, they are not more likely to reward teachers who are certified by the National Board or who teach in the subject areas of shortage, nor are they more likely to offer multiple financial incentives.

Keywords Incentive pay; Performance-related pay; Teacher recruitment; Teacher retention; SASS

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Reforming teacher compensation with incentive pay programs has been a frequently discussed education policy for the recruitment and retention of highly qualified teachers (Johnson & Papay, 2009; Liang, 2013a; Podgursky & Springer, 2007). In 2006, Congress appropriated $99 million for the Teacher Incentive Fund. The program aimed at reforming teacher and principal compensation systems to enhance student achievement and improve the distribution of effective teachers. The appropriation soared to $400 million in 2010 and remained as high as $399 million in 2011 and $299 million in 2012. Under the *American Recovery and Reinvestment Act* of 2009, the federal government issued the $4.35 billion Race to the Top Fund. This competitive grant program encouraged states to provide additional pay to recruit and retain highly effective teachers and principals, especially where they were needed most.

State policy makers have been promoting teacher incentive pay programs as well. By the 2009–2010 academic year, states had enacted policies of providing financial incentives to attract teachers in math (15 states), science (15 states), and special education (14 states). There were similar state policies for teachers teaching in schools that were hard to staff due to high poverty levels (13 states), low performance (13 states), or geographic isolation (3 states). In addition, 31 states rewarded teachers for earning certification from the National Board of Professional Teaching Standards (NBPTS, or National Board), and 10 states rewarded them for raising student achievement (Education Week, 2011).

In spite of national interest, our knowledge base about the implementation of these programs is still limited (Liang, 2013a; Loeb, Miller, & Strunk, 2009; Podgursky & Springer, 2007). There is little empirical work with nationally representative data that examines the influence of teachers' unions on districts' incentive pay programs. In addition, we do not know much about the district characteristics associated with the use of financial incentives for teachers within the context of accountability and standards-based reforms. Understanding the influence of teachers' unions and district characteristics constitute important implementation data for state- and federal-level policy makers considering the direction of incentive pay policies. It is also important to examine whether disadvantaged districts are more likely to utilize these programs to enhance their capacity for human resource management and improving student learning.

To fill the knowledge gap, this study used the nationally representative 2007–08 Schools and Staffing Survey (SASS) dataset to examine the influence of teachers' unions on financial incentives offered by districts and the relationship between district characteristics and districts' use of these programs. Specifically, it addressed the following research questions:

1. How did school districts in the United States use incentive pay programs to recruit and retain teachers in 2007–08?
2. How did the use of incentive pay programs differ according to the influence of teacher unions?
3. What were the characteristics of the districts that offered incentive pay programs?

Literature review

Theoretical framework

This study used the principal–agent theory as the overarching conceptual framework. According to this theory, a principal–agent relationship exists when the principal contracts the agent to perform services and provide goods. The objective of the principal is always to maximize the principal's own payoff. A key assumption in this theory is that various information asymmetries exist between the principal and the agent. In the public education system, a school district employs teachers to teach and pays them for their teaching efforts. However, the teachers have more information on their teaching efforts and effectiveness in improving student achievement than the district does. The key task for the district, therefore, is to design an incentive pay scheme that will induce the teachers to perform in a way that is aligned with the district's goals and to produce the desired outputs at the lowest cost to the district (Dixit, 2002; Levacic, 2009).

To maximize its own welfare, according to the principal–agent theory, a district will only choose to offer a certain type of incentive pay when the benefits exceed the administrative and political costs of the program. The greater the influence and opposition of teachers' unions in the district, the higher the political costs for program implementation and the less likely the district is to offer the program. Conversely, greater influence and support from the teachers' unions lowers the political costs and makes the district more likely to offer the program. In addition, districts are more likely to offer incentive pay programs that meet their educational goals and needs best. Therefore, if a district has high rates of teacher attrition in some subject areas (e.g., mathematics), the district should be more interested in offering targeted financial incentives to mathematics teachers.

Types of teacher incentive pay programs

District policy makers might choose to implement different types of incentive pay programs. Some of the commonly offered programs are aimed at teachers (a) who teach in subject areas of shortage (e.g., mathematics), (b) who teach in hard-to-staff schools (e.g., geographically isolated schools), (c) who improve their knowledge and/or skills (e.g., National Board certification), or (d) who perform exceptionally well (Springer, 2009).

The first two types of programs respond to market demands. Many schools and districts find it challenging to recruit and retain teachers, especially in mathematics, science, and special education (Podgursky, 2009). Because compensation is a major factor affecting a teacher's career decision of both entering the teaching field and staying in the profession, one way to address the problem is to provide targeted pay incentives. The additional earning opportunities may help with teacher recruitment and retention and with the inequitable distribution of highly qualified teachers among school districts.

Alternatively, districts may choose to offer knowledge- and skill-based pay and to reward teachers for developing their knowledge and skills (Odden & Kelley, 2002; Springer, 2009). An example is rewarding teachers with additional pay for earning

National Board certification. A growing body of empirical studies have shown that a teacher's certification by the National Board was positively associated with higher student achievement (Cavalluzzo, 2004; Clotfelter, Ladd, & Vigdor, 2007; Goldhaber & Anthony, 2007; Vandervoort, Amrein-Beardsley, & Berliner, 2004).

The fourth program rewards teachers for outstanding results in performance evaluation. Within current national policy contexts, this is perhaps the most controversial as well as the most broadly studied type of incentive pay program. There exists a growing body of empirical studies on its use in the United States (e.g., Liang & Akiba, 2011), and its impact on teacher practice (Liang, 2013b; Liang & Akiba, 2013) and student achievement (e.g., Eberts, Hollenbeck, & Stone, 2002; Figlio & Kenny, 2007; Winters, Ritter, Greene, & March, 2009). A recent review (Liang, 2013a) showed promising, but not conclusive, impacts of these performance-related pay programs on improving teacher practice and student learning.

To our knowledge, only a few empirical studies have examined districts' use of incentive pay programs for teachers. Balter and Duncombe (2008) found that to recruit new teachers, 15.6 percent of districts in New York in 2004 offered additional compensation for teachers certified by the National Board, but only 7.3 percent did so for teachers teaching in hard-to-staff fields, and 0.4 percent did so for teachers teaching in hard-to-staff schools. A study in California (Strunk & Zeehandelaar, 2011) showed that in 2008–09, 21.7 percent of districts offered incentive pay for teachers certified by the National Board, while only 1.1 percent did so for math teachers, 1.0 percent for science teachers, and 0.4 percent for teachers teaching in disadvantaged schools.

Teachers' unions and teachers' incentive pay programs

Teachers' unions have played a crucial role in education, and their positions have often been a deciding factor in the implementation of many educational initiatives and policies. The National Education Association (NEA) supported providing extra compensation for teachers to teach in hard-to-staff schools or to earn National Board certification but opposed tying pay to student test scores or subject areas of teaching. The American Federation of Teachers (AFT) supported giving additional compensation to teachers earning National Board certification, working in challenging schools, and assuming extra duties. Unlike the NEA, the AFT supported providing extra compensation for teachers in the subject areas of shortage (Koppich, 2010).

Historically, teachers' unions' opposition to linking teacher compensation to student achievement has led to the failure of many performance-related pay (PRP) programs (Darling-Hammond & Berry, 1988; Hatry, Greiner, & Ashford, 1994; Murnane & Cohen, 1986). Recent empirical studies have also consistently identified an inverse relationship between union influence and the probability of districts' offering of PRP programs (Ballou, 2001; Goldhaber, DeArmond, Player, & Choi, 2008; Liang & Akiba, 2011). For example, Liang and Akiba (2011) found that relative to districts having collective bargaining agreements, the probability of offering PRP was 19.8 percentage points higher for districts with meet-and-confer plans, and 35.4 points higher for districts with no bargaining agreements. West and Mykerezi (2011) examined the impact of collective bargaining on multiple dimensions of teacher com-

pensation, including the use of different incentive pay schemes. They found that teachers' unions tended to support incentive pay programs that were based on additional qualifications or duties, but tended to discourage programs that directly rewarded teachers for improved student test scores.

District characteristics and teacher incentive pay programs

Studies on teacher mobility have consistently shown that teachers in the subject areas of shortage were more likely to leave the profession than were teachers specialized in other subjects (Henke, Zahn, & Carroll, 2001; Ingersoll, 2001; Kirby, Berends, & Naftel, 1999; Podgursky, Monroe, & Watson, 2004). In addition, teacher attrition rates were higher in districts with higher student enrollment (Mont & Rees, 1996; Murnane & Olsen, 1989, 1990) and higher proportions of ethnically diverse students (Carroll, Reichardt, Guarino, & Mejia, 2000; Hanushek, Kain, & Rivkin, 2004; Mont & Rees, 1996). Compared with suburban districts, attrition rates were higher in urban and rural districts (Kirby, Berends, & Naftel, 1999; Monk, 2007). Therefore, large and ethnically diverse districts in urban and rural areas were in greater need of highly qualified teachers. One would expect them to be more willing to use financial incentives as a policy lever to combat the uneven distribution of highly qualified teachers.

On the other hand, implementing and sustaining these programs often requires substantial and continuous financial investment. Within the current context of budget cuts and financial constraints, these high-need districts, particularly small rural districts, may lack the financial capacity for program implementation and sustention.

The existing literature on financial incentives for teachers focuses on state level policies and initiatives (Clotfelter, Glennie, Ladd, & Vigdor, 2008; Fowler, 2003; Loeb, Miller, & Strunk, 2009; Steele, Murnane, & Willett, 2010), and particularly on the PRP programs (Belfield & Heywood, 2008; Goldhaber et al., 2008; Liang & Akiba, 2011). Few studies are available that use nationally representative data to explore the implementation of incentive pay programs across the country.

Using survey data on 494 school district superintendents in New York State in 2004, Balter and Duncombe (2008) examined the use of financial incentives to recruit new teachers. They found that larger school districts were more likely to offer financial incentives, particularly for National Board–certified teachers. High-need rural districts, however, were less likely to do so. In addition, their study suggested that districts using only a limited set of recruitment practices hired less qualified teachers.

Using California data, Strunk and Zeehandelaar (2011) found that districts with more Hispanic students were more likely to offer incentives either for bilingual/ESL teachers and teachers of special education, but less likely to reward teachers for National Board certification. Rural districts were significantly less likely than suburban districts to offer an incentive for certification by the National Board for Professional Teaching Standards (NBPTS), and larger school districts more likely to offer a bundle of incentive pay programs.

Because in California it is mandatory that districts negotiate with teachers' unions on teacher compensation policies, Strunk and Zeehandelaar (2011) did not factor the influence of teachers' unions into their study. In addition, districts in California had much higher percentages of Hispanic students: the average proportion of

Hispanic students in each district was 43 percent, and over one fifth of districts had a Hispanic population over 70 percent. During the same period, the national average of Hispanic students was 13 percent; in only seven states (NM, CA, TX, AZ, NV, CO, and FL) were more than one out of four students Hispanic (Snyder & Dillow, 2011). Furthermore, similar to Balter and Duncombe (2008), Strunk and Zeehandelaar's (2011) study focused on one state only. It is therefore important to examine the use of financial incentives for teachers in other states with different local contexts and policy characteristics.

Our study used nationally representative SASS data to examine the implementation of different types of teacher incentive pay programs in the United States. In applying the principal–agent model, we developed two hypotheses:

1. Districts are more likely to offer teacher incentive pay programs when there is less union influence in the district.
2. Large and ethnically diverse districts in rural and urban areas are more likely to offer a larger number of teacher incentive pay programs than other districts.

Method

Data

This study used the district survey data from the 2007–08 Schools and Staffing Survey (SASS). The SASS produced the largest and most nationally representative datasets on elementary and secondary schools, districts, and teachers in the United States. The district survey in the SASS contains rich information on district characteristics and policies, such as student enrollment, staffing patterns, teacher recruitment and retention practices, and salary schedules.

The SASS used a complex and stratified probability sample design to acquire sufficient data for estimates. The 2007–08 SASS sample was a school-based stratified probability-proportionate-to-size sample. All schools except those funded by the Bureau of Indian Education were sampled using multiple stratification factors, including grade range and school type. The districts associated with the sampled public schools were selected as the district sample. However, all districts in Delaware, Florida, Maryland, Nevada, and West Virginia were included in the sample to improve the reliability of SASS school district estimates. The data were collected by the Census Bureau via mailed questionnaires with telephone and field follow-up. The response rate was as high as 87.8 percent (Aritomi, Coopersmith, & Gruber, 2009).

Variables

Teacher incentive pay programs

In the questionnaire, district officials were asked, "Does this district currently use any pay incentives such as cash bonuses, salary increases, or different steps on the salary schedule?" to (a) reward teachers who have attained NBPTS certification, (b) reward excellence in teaching, (c) recruit or retain teachers to teach in a less desirable location, or (d) recruit or retain teachers to teach in fields of shortage. Four dummy

variables were created for each type of incentive pay program by recoding the official's responses as either 1 or 0, where 1 = district offering the particular type of teacher incentive pay program, and 0 = otherwise. Another dummy variable was created based on the sum of the district officials' answers to the four questions, with 1 = district offering two or more incentive pay programs, and 0 = otherwise. Appendix A provides the list of all the variables and their coding schemes.

Influence of teachers' unions

District officials were asked, "Does this district have an agreement with a teachers' association or union for the purpose of meet-and-confer discussions or collective bargaining?" with possible responses being, "Yes, meet-and-confer," "Yes, collective bargaining," and "No." Two dummy variables were created for districts with meet-and-confer discussions and districts with no bargaining agreements. Districts with collective bargaining agreements with teachers' unions were used as the reference group. These classifications have been commonly used to measure the influence of teachers' unions in districts (e.g., Liang & Akiba, 2011). They were important in addressing the first research question of this study.

District characteristics

The variables for district characteristics included (a) poverty level, as measured by the percentage of students approved for free or reduced-priced lunch; (b) ethnic diversity level, as measured by the percentages of ethnic minority students; (c) district size, as measured by K-12 enrollment; (d) location, as measured by two dummy variables for rural districts and urban districts, with suburban districts as the reference group; (e) Adequate Yearly Progress (AYP) status as defined under NCLB, coded as 1 (the district made AYP at the end of the last school year) and 0 (otherwise); and (f) the normal yearly base salary for a teacher with a Master's degree and no teaching experience on the salary schedule. Appendix B presents the descriptive statistics of the variables in the study.

Analysis

The SASS utilized a complex sampling methodology including stratifying the school sample, oversampling new teachers, and sampling with unequal probabilities. Therefore, weights should be used to adjust for differential sampling probabilities and for differential non-responses. Direct estimations of sampling errors that assume a simple random sample would underestimate the variability in the estimates. The preferred method of calculating the standard errors to reflect these sampling design characteristics was to use replication with the balanced repeated replicate weights. This method constructed replicates from the full sample and computed the statistics of interest for each replicate. The mean square error of the replicate estimates provided an estimate of the variance of the statistic for the full sample (Aritomi, Coopersmith, & Gruber, 2009).

Given the complex sampling methods and variance estimation procedures in SASS, this study used AM statistical software (version 0.06.03 Beta) developed by the American Institutes for Research and applied the balanced repeated replication

methods with the 88 replicate weights in the district data file for the replication procedures. The final weighting variable was linearly transformed to reflect the actual sample size. Missing and extreme values were replaced with the series means.

To answer the first research question, descriptive statistics were calculated and reported. To address the second and third questions, a series of binary logistic regressions were conducted to examine the relationship between district characteristics and districts' probability of offering each type of incentive pay programs. The models took the following basic form:

$$\ln[p/(1-p)]=\beta_0+\beta_1 MeetConfer+\beta_2 NoBargaining+\beta_3 Poverty+\beta_4 Minority+\beta_5 Enroll+\beta_6 Rural+\beta_7 Urban+\beta_8 AYP+\beta_9 Salary+\varepsilon$$

In this form, p was the probability that a district would offer a specific type of incentive pay program. The coefficients $\beta 1$ through $\beta 9$ represented the associations between each district characteristic and the dependent variable, and ε was the random error term.

Results

Union influence and districts' offering of incentive pay programs

As shown in Table 1, during the 2007–08 academic year, 24.5 percent of districts in the United States used financial incentives to recruit, retain, and reward teachers for National Board certification, 10.2 percent for excellence in teaching, 15.4 percent for teaching in subject areas of shortage, and 5.7 percent for teaching in challenging schools. About two fifths offered at least one incentive pay program, and 12.0 percent offered two or more at a time.

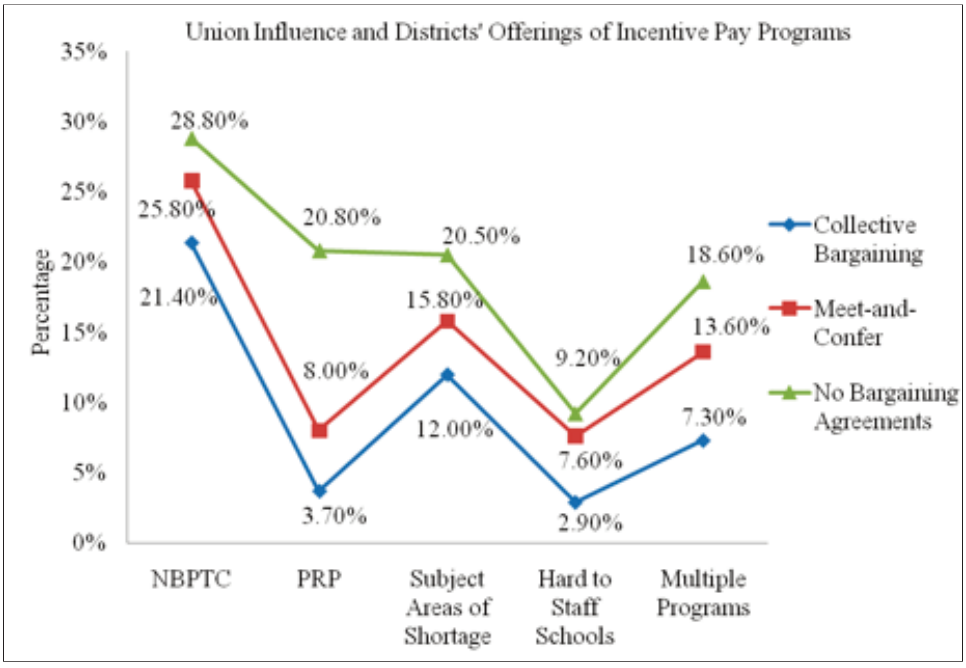
Table 1. Incentive pay programs offered by districts in the United States: 2007–08 (*N* = 4,601)

Incentive Pay Programs	*Percentage*
National Board certification	24.5%
Performance-related pay	10.2%
Subject areas of shortage	15.4%
Hard-to-staff schools	5.7%
One or more programs	39.0%
Multiple incentive pay programs	12.0%

Union influence and districts' offerings of incentive pay programs

Figure 1 presents the percentages of districts that offered different types of incentive pay programs, categorized by the influence of teachers' unions in the district. The upper line represents the districts with no bargaining agreements, the middle line those with meet-and-confer discussions, and the bottom line those with collective bargaining agreements.

Figure 1. Percentages of districts that offered various teacher incentive pay programs



Note: Based on the Schools and Staffing Survey, 2007–2008.

As shown in Figure 1, of the four types of programs, districts were consistently most likely to reward teachers who were certified by the National Board, as supported by teachers' unions. In comparison, smaller percentages of districts rewarded teachers in subject areas of shortage; such rewards were opposed by the NEA but supported by the AFT. Surprisingly, although both the NEA and the AFT were in favor of providing teachers with additional pay for teaching in hard-to-staff schools, the data showed that this program was the least commonly used. The percentages of districts offering PRP programs varied significantly across the three groups.

In addition, we could see a consistent and inverse relationship between the influence of teachers' unions and districts' use of incentive pay programs. Compared with the districts that had collective bargaining agreements, higher percentages of districts with meet-and-confer discussions offered financial incentives for National Board certification (25.80% vs. 21.40%), performance-related pay (8.00% vs. 3.70%), teaching in subject areas of shortage (15.80% vs. 12.00%), and teaching in hard-to-staff schools (7.60% vs. 2.90%). In addition, the percentage of the meet-and-confer districts that used multiple incentive pay programs was almost twice that of the districts with collective bargaining agreements (13.60% vs. 7.30%).

In a similar pattern, districts that had no agreements with teachers' unions were more likely than meet-and-confer districts to offer more financial incentives. Among the districts with no agreements, 28.80 percent provided financial incentives to teachers certified by the National Board, over one fifth rewarded outstanding teacher performance (20.80%) and teaching in subject areas of shortage (20.50%), and 9.20 percent had programs targeting teachers in hard-to-staff schools. In addition, 18.6 percent of districts offered multiple incentive pay programs.

Based on the findings from Figure 1, a series of Chi Square tests of independence were performed, and the results are presented in Table 2. Again, we saw inverse relations between union influence and districts' offerings of teacher incentive pay programs, and the differences were statistically significant at the .001 level across the programs.

Table 2. Chi Square tests of union influence and districts' offerings of incentive pay programs

Program Type	Negotiation Type	Yes		No		Chi Square Test
		n	%	*n*	%	
National Board Certification	Collective bargaining	527	21.4	1937	78.6	$\chi^2(2, N = 4{,}601) = 29.51$ $p = .000$
	Meet-and-confer	129	25.8	371	74.2	
	No agreements	471	28.8	1166	71.2	
Performance Related Pay	Collective bargaining	91	3.7	2372	96.3	$\chi^2(2, N = 4{,}599) = 315.32$ $p = .000$
	Meet and confer	40	8.0	460	92.0	
	No agreements	340	20.8	1296	79.2	
Subject Areas of Shortage	Collective bargaining	295	12.0	2169	88.0	$\chi^2(2, N = 4{,}601) = 55.32$ $p = .000$
	Meet-and-confer	79	15.8	422	84.2	
	No agreements	336	20.5	1300	79.5	
Hard to Staff Schools	Collective bargaining	71	2.9	2393	97.1	$\chi^2(2, N = 4{,}601) = 78.21$ $p = .000$
	Meet-and-confer	38	7.6	462	92.4	
	No agreements	151	9.2	1486	90.8	
Multiple Incentive Pay Programs	Collective bargaining	179	7.3	2285	92.7	$\chi^2(2, N = 4{,}601) = 121.73$ $p = .000$
	Meet-and-confer	68	13.6	432	86.4	
	No agreements	305	18.6	1332	81.4	

Characteristics of the districts offering teacher incentive pay programs

A series of logistic regression analyses were conducted to further examine the influence of teachers' unions and district characteristics on districts' offerings of incentive pay programs. Since a previous study (Liang & Akiba, 2011) has examined the offering of PRP programs using the same data, this study focused on the other teacher incentive pay programs and the use of multiple programs. Table 3 presents the logistic regression results.

The first model focused on the financial incentive for National Board certification. Controlling for other factors in the table, the logit of offering this program for meet-and-confer districts was 0.301 higher than for collective bargaining districts. In other words, the probability of offering this program for meet-and-confer districts was 7.5 percentage points higher than for collective bargaining districts. The probability was 17.9 percentage points higher for districts that had no bargaining agreements. In addition, a one point increase in the percentage of students receiving free or reduced-price lunch was associated with a 0.1 percentage point increase in the probability of district program decisions. A one point increase in ethnic minority students was associated with a 0.1 percentage point decrease in the probability of

offering the program. An increase of 1,000 students in districts' enrollment was related to a 0.7 percentage point increase.

In addition, the probability of using such a program for urban districts was 13.2 percentage points higher than for suburban districts, but rural districts were not more likely than suburban districts to do so. Furthermore, the probability for districts that did not meet requirements for Adequate Yearly Progress was 16.8 percentage

Table 3. Binary logistic regressions on the probability of districts' offerings of incentive pay programs

	National Board certification		Subject areas of shortage		Hard to staff schools		Multiple incentive pay programs	
	B (SE)	Prob.[a]	B (SE)	Prob.	B (SE)	Prob.	B (SE)	Prob.
Meet and confer	0.301*** (0.082)	0.075	0.302*** (0.092)	0.075	0.906*** (0.136)	0.212	0.828*** (0.094)	0.196
No bargaining agreements	0.748*** (0.094)	0.179	0.697*** (0.094)	0.168	0.539*** (0.140)	0.132	0.812*** (0.096)	0.193
% poverty	0.005* (0.002)	0.001	0.002 (0.002)	0.000	0.009*** (0.003)	0.002	0.004 (0.002)	0.001
% minority	-0.004** (0.001)	-0.001	0.013*** (0.002)	0.003	0.016*** (0.003)	0.004	0.012*** (0.002)	0.003
Enrollment (in thousands)	0.029*** (0.002)	0.007	0.013*** (0.001)	0.003	0.017*** (0.001)	0.004	0.022*** (0.002)	0.005
Rural district	-0.084 (0.082)	-0.021	-0.083 (0.089)	-0.021	0.389** (0.148)	0.096	-0.020 (0.085)	-0.005
Urban district	0.542*** (0.104)	0.132	0.452*** (0.100)	0.111	0.404*** (0.122)	0.100	0.520*** (0.107)	0.127
AYP status	0.699*** (0.068)	0.168	0.313*** (0.089)	0.078	0.610*** (0.110)	0.148	0.695*** (0.084)	0.167
Avg. salary (in $1,000)	0.051*** (0.008)	0.013	-0.020* 0.010)	-0.005	-0.036* (0.017)	-0.009	-0.009 (0.013)	-0.002
Constant	-3.544*** (0.314)	-0.472	-1.679*** (0.406)	-0.343	-3.406*** (0.616)	-0.468	-3.033*** (0.495)	-0.454
	3950		3950		3950		3950	

Notes: a The probability change in the districts' use of the teacher incentive pay program with a one-unit increase in each independent variable controlling for the other variables in the models was computed based on the equation exp(B) / [1 + exp(B)] - .50; *$p < .05$, ** $p < .01$, ***$p < .001$

points higher than for those that did. An increase of $1,000 in a district's average salary was associated with a 1.3 percentage point increase in program offering. These findings have practical significance as well. For example, for a district with average characteristics, as described in the sample in Appendix B (e.g., the average salary for a teacher with a master's degree is $36,717), the probability of rewarding teachers for National Board certification was 4.1 percentage points. For another district with the same characteristics but a salary of $46,717, the probability would be 17.1 percentage points, three times higher than the former.

The second model examined financial rewards for teachers in subject areas of shortage (e.g., math, science, and special education). Again, districts with meet-and-confer discussions and districts with no bargaining agreements were significantly more likely than districts with collective bargaining to offer the program. In addition, larger and more ethnically diverse districts in urban areas with lower levels of student

achievement were more likely to offer this program than other districts. The average teacher salary in the district, however, was negatively associated with the probability of rewarding teachers in subject areas of shortage.

The third model focused on rewarding teachers in hard-to-staff schools. The results were very similar to those for incentive programs addressing subject areas of shortage, except in the percentage of poor students and the comparison between rural and suburban districts. Controlling for other factors in the model, a one point increase in the percentage of poor students was associated with a 0.2 percentage point increase in the probability of offering this program. In addition, the probability of rewarding teachers in disadvantaged schools was 9.6 percentage points higher for rural districts than for suburban districts.

To better motivate the targeted teachers, districts may offer multiple incentive pay programs at a time and make the rewards more substantial and attractive. The last model explored districts' offerings of multiple financial incentives. Again, districts with less union influence were more likely to offer multiple incentive pay programs. In addition, large districts in urban areas with a higher percentage of ethnically diverse students that did not make the AYP were more likely to offer multiple incentive pay programs simultaneously.

Discussion

Using the nationally representative SASS dataset, this study is a first attempt to examine districts' offerings of teacher incentive pay programs across the nation. During the 2007–08 academic year, 39.0 percent of the districts in the United States employed at least one incentive pay program, and 12.0 percent used two or more financial incentives for teachers. These percentages are smaller than those in California, where 72.8 percent of districts used at least one incentive policy and 38.8 percent employed multiple rewards (Strunk & Zeehandelaar, 2011).

Consistent with the findings in the previous research on PRP programs (Belfield & Heywood, 2008; Goldhaber et al., 2008; Liang & Akiba, 2011) and the principal–agent theory, this study finds that the influence of teachers' unions is significantly and inversely related to districts' offerings of incentive pay programs. In addition, although both the National Education Association (NEA) and the American Federation of Teachers (AFT) are supportive of offering additional pay to teachers certified by the National Board, our analysis shows a negative relationship between union influence and the districts' use of this program. One plausible explanation may be that teachers' unions have been advocating and prioritizing providing teachers with professionally competitive pay and raising salaries across the board, rather than offering incentive pay programs. Research has shown positive associations between teacher salary and teacher mobility (e.g., Imazeki, 2005), and student achievement (e.g., Akiba, Chiu, Shimizu, & Liang, 2012).

In addition, we find that large and ethnically diverse districts in urban areas are generally more likely to offer a larger number of incentive pay programs for teachers than are small suburban districts with a more homogeneous student population. This is consistent with the findings of a previous study (Liang & Akiba, 2011) on PRP and the principal–agent model. Because these high-need districts have higher rates of

teacher attrition and are in greater need of highly qualified teachers in high demand, they are more likely to use these programs as policy levers to motivate teachers. For a similar reason, districts that did not make the AYP are more likely than those who made the AYP to offer incentive pay programs.

More importantly, our analysis shows that although rural districts are more likely to reward teachers teaching in hard-to-staff schools, they are not more likely to do so for teachers certified by the National Board, teachers in the subject areas of shortage, or to offer multiple programs simultaneously. Because small rural districts have higher rates of teacher attrition and lower student achievement (Kirby, Berends, & Naftel, 1999; Monk, 2007) and because incentive pay may be an important tool for the recruitment and retention of targeted teachers, this finding is a concern.

Furthermore, we find that the average salary for teachers in a given district is a significant factor predicting that district's offering of incentive pay programs. Wealthy districts with higher salary levels are more likely to provide financial incentives for teachers who have demonstrated excellence by earning a National Board certification. Since higher salary offerings give wealthy districts an advantage over poor districts, this finding indicates that incentive pay programs may further exacerbate the unequal distribution of highly qualified teachers across districts.

Before discussing the policy implications, it is important to identify the limitations of this study. In the first place, the district survey in the SASS data set does not disaggregate the incentive pay programs for new and existing teachers, nor does it contain information on the magnitudes or the types of the awards. A school district may use different incentive strategies and offer different programs to recruit new teachers and retain existing teachers. In addition, this study did not examine the effectiveness of these programs in recruiting and retaining the targeted teachers or enhancing student achievement. The existing literature has reached mixed conclusions about the impact of financial incentive policies in California (Steele, Murnane, & Willett, 2010), Massachusetts (Fowler, 2003), and North Carolina (Clotfelter et al., 2008). Furthermore, the literature has suggested that financial incentives may introduce perverse incentives (e.g., Ariely, Gneezy, Loewenstein, & Mazar, 2009; Adams, Heywood, & Rothstein, 2009). Although the different programs are often lumped under the umbrella of financial incentives, it is important for future studies to explicitly distinguish between different types of teacher incentive pay programs. Furthermore, given that school districts are nested within states, future studies may consider using multilevel models to examine the variation in offerings of incentive pay programs.

Although the effectiveness of teacher incentive pay programs is a major concern for policy makers, it is also important to know the implementation characteristics of these programs. This empirical study is the first across the nation to examine the characteristics of school districts in relation to the different types of incentive pay programs they offer to teachers. The findings have important implications.

Policy and leadership implications

Many schools and districts are having difficulty recruiting and retaining highly qualified teachers in the subject areas of shortage. However, this study shows that only

a small percentage (15.4%) of districts offer targeted financial incentives for those teachers in high demand, and that an even smaller percentage (5.7%) offer incentives for teachers in challenging schools. To maximize the equitable distribution of the teacher workforce and to improve student learning, it is therefore important for district leaders to revisit their teacher compensation policies and to prioritize providing financial incentives to those teachers whom the district needs most.

Although small rural districts are often in greatest need of highly qualified teachers, this study finds that they are not more likely to implement incentive pay programs to recruit and retain teachers with demonstrated excellence or teachers in the subject areas of shortage. One plausible reason may be their lack of financial capacity to implement or sustain teacher incentive pay programs. Given the national interest in improving all students' achievement, it is important for federal and state policy makers to consider providing continuous, adequate, and targeted assistance to those high-need districts.

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Appendix A. Descriptions of the variables

Variable	SASS Variable Name: Description
Incentive Pay Programs	
National Board certification	D0347, 1 = district offers pay incentives to reward teachers certified by the National Board, 0 = otherwise
Performance-related pay	D0348, 1 = district offers pay incentives to reward excellence in teaching, 0 = otherwise
Subject areas of shortage	D0350, 1 = district offers pay incentives to recruit or retain teachers in fields of shortage, 0 = otherwise
Hard-to-staff schools	D0349, 1 = district offers pay incentives to recruit or retain teachers in a less desirable location, 0 = otherwise
Multiple incentive pay programs	1 = district offers two or more teacher incentive pay programs, 0 = otherwise
Teacher Union Influence	
Meet-and-confer	D0296, 1 = district has an agreement with a teachers' union for meet-and-confer discussions, 0 = otherwise
No bargaining agreement	D0296, 1 = district has no agreement with a teachers' union on meet-and-confer discussions or collective bargaining, 0 = otherwise
Student Characteristics	
% free or reduced-price lunch	NSLAPP_D
% ethnic minority students	NMINST_D / D0276 * 100
K-12 enrollment	D0276, total enrollment of K-12 students
District Characteristics	
Rural district	URBAND8, 1 = rural school district, 0 = otherwise
Urban district	URBAND8, 1 = urban school district, 0 = otherwise
District AYP status	D0385, 1 = district made Adequate Yearly Progress at the end of 2006-07 school year, 0 = otherwise
Salary for Master's degree	D0332, normal yearly base salary for a teacher with a Master's degree and no teaching experience
Number of buildings	AG_NOSC2
% ethnic minority teachers	NMNTCH_D / D0295 * 100

Appendix B. Descriptive statistics of the variables

	N	Min.	Max.	Mean	SD
Teachers' Union Influence					
Meet-and-confer	4601	0	1	0.109	0.311
No bargaining agreement	4601	0	1	0.356	0.479
Student Characteristics					
% free or reduced-price lunch students	4601	0	100	43.159	23.434
% ethnic minority students	4601	0	100	27.940	29.369
K-12 enrollment (in thousands)	4601	0	1100	3.018	13.798
District Characteristics					
Rural district	4601	0	1	0.427	0.495
Urban district	4601	0	1	0.124	0.330
District AYP status	3107	0	1	0.269	0.443
Average salary for Master's degree (in $1,000)	4601	15	70	36.717	6.213