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# Characteristics and Determinants of Teacher-Designed Pay for Performance Plans: Evidence from Texas' Governor's Educator Excellence Grant (GEEG) Program

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# Characteristics and Determinants of Teacher-Designed Pay for Performance Plans: Evidence from Texas' Governor's Educator Excellence Grant (GEEG) Program

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## 1. INTRODUCTION

Many localities and states are experimenting with teacher pay for performance. In 2006, the U.S. Congress appropriated $99 million per year for each of five years to provide Teacher Incentive Fund grants to schools, districts, and states to develop and evaluate administrator and teacher pay for performance plans. Teacher performance is part of compensation packages in the Dallas (TX), Denver (CO), Houston (TX) and New York City (NY) public school systems. Educators deemed to be high performing across the states of Florida, Minnesota, and Texas claim their shares of more than $550 million in incentives each year.[1]

Despite all the activity, however, there is still relatively little evidence about the characteristics of optimal incentive pay plans for teachers. Some of the economics literature indicates that winner-take-all plans, wherein only a few workers receive large awards, are the most effective at motivating workers. Other studies support providing a broad array of bonus awards to individual employees. Still other studies suggest that group-based incentives are the most effective strategy when teamwork and cooperation are integral to the production process—as is arguably the case in education.

This study describes the teacher pay for performance plans designed and implemented by the public schools participating in the Governor's Educator Excellence Grant program (GEEG) in Texas. GEEG is a federally funded, incentive pay program that awarded non-competitive grants, ranging from $60,000 to $220,000 each year for three years, to 99 Texas schools. Participating schools were required to develop their own pay for performance plans, and to demonstrate significant teacher involvement in the design and approval of those plans.[2]

Schools participating in the GEEG program took advantage of their considerable discretion to design incentive plans exhibiting an array of differences on several key plan variables. Such

variation provides a unique opportunity for analysis. This study explores the following research questions:

1. How did schools propose to distribute awards to teachers, and how did a GEEG school's proposed award distribution plan play out in practice?
2. What is the relationship between teacher characteristics and the dollar amounts awarded to teachers as part of their school's GEEG plan?
3. What are the determinants of GEEG plan characteristics and the distribution of awards?

Because of the variation in plan designs and the prominent role that teachers played in designing and approving the incentive pay plans, this analysis can offer important insights into the nature of compensation reforms that educators perceive to be acceptable. Identifying the features that make pay for performance plans attractive to teachers is crucial for future compensation reform efforts because the failure of many previous programs has been attributed to a lack of teacher engagement and buy-in around plan design.[3] Furthermore, knowing whether teacher and school characteristics are associated with particular GEEG plan characteristics could help policymakers and other education stakeholders better understand how different groups may perceive various design features of a teacher compensation reform proposal.

The subsequent study is divided into the following four sections. Section II provides an overview of the GEEG program defined by the Texas Education Agency (TEA) and characteristics of pay for performance plans designed and implemented by eligible schools. Sections III and IV offer descriptions of the study's analytic strategy and results, respectively. Section V discusses conclusions within the context of current dialogue on pay for performance policies in K-12 public schools.

## 2. TEXAS' GOVERNOR'S EDUCATOR EXCELLENCE GRANT PROGRAM

The Governor's Educator Excellence Grant (GEEG) program is a three-year program that awarded non-competitive grants to the 100 highest poverty high performing schools in the state. Schools were first notified of their eligibility for the program during the 2005-06 school year, and were required to develop and submit their incentive plan proposals by the end of that school year. Because one school never finalized the design of its GEEG plan with TEA, a total of 99 schools participated in the GEEG program.

The GEEG award amounts were substantial. Most schools received between $150 and $200 per pupil for each of three years, which was equivalent to between 2.6 and 15 percent of a recipient school's instructional payroll. The average grant amount was 5.2 percent of instructional payroll.

To be eligible for the GEEG program, schools had to be in the top third of Texas schools with respect to the share of economically disadvantaged students during the 2004-05 school year. TEA determined eligibility for GEEG separately for elementary, middle, all grade, and high schools: elementary schools had to be in the top third of the poverty distribution for elementary schools, middle schools had to be in the top third of the distribution for middle schools and so on. The identification strategy resulted in economically disadvantaged student thresholds of 81.3 percent for elementary schools, 65.4 percent for middle schools, 55.8 percent for high schools, and 70.5 percent for schools that serve mixed grade configurations.

Up to half of the eligible schools had to be identified as high performing. High performing schools attained one of the two highest ratings in the Texas Accountability System— Recognized or Exemplary—for the 2004-05 school year.[4] Among other things, a Recognized rating in 2004-05 meant that for every subject and every student subgroup at least 70 percent of the tested students passed the state's high-stakes assessment, the Texas Assessment of Knowledge and Skills (TAKS).[5] An Exemplary rating elevated this standard to at least 90 percent of the tested students in each

subject and subgroup passing the TAKS. Ultimately, all public schools with an Exemplary rating in the 2004-05 school year that were also in the top third with respect to student poverty were GEEG eligible, as were the Recognized schools with the highest shares of economically disadvantaged students in each grade type.

The remaining eligible schools were high improving schools defined as being in the top quartile on either the Comparable Improvement (CI) math or the CI reading/language arts rankings in 2004-05. TEA determines the CI rankings by matching each Texas public school annually to 40 other Texas public schools on the basis of student demographics. TEA then calculates the average change in student test scores from one year to the next and places schools into quartiles based on their relative position among their 40 most comparable schools. A school in the top quartile of CI has one of the 10 largest average gains in TAKS scores among the 40 schools in its reference group.

TEA established a set of guidelines for schools to reference when designing their pay for performance plans. Those guidelines divide GEEG program funding into two parts. Part 1 funds were to be used for awards paid directly to teachers who teach four or more hours during the typical academic day (full-time teachers). Part 2 funds were to be used to provide awards to other school personnel, or to fund professional development programs for teachers, induction programs for teachers, or other professional growth opportunities. Seventy-five percent of the total GEEG awards were dedicated to Part 1 incentives, while the remaining 25 percent were dedicated to funding Part 1 or Part 2 activities.

TEA guidelines further stipulate that Part 1 fund awards must be based on two criteria: success in improving student achievement (as evidenced by an objective performance measure) and a teacher's collaboration with faculty and staff. Although both student achievement and collaboration are required criteria of a school's GEEG plan, schools had a great deal of flexibility when it came to defining the actual performance measures and benchmarks used to evaluate

teachers' performance. As illustrated in Table 1 (Panel A), the most common measures of student achievement were student assessments, and most schools chose more than one indicator to evaluate this criterion.

Insert Table 1 Here

Schools also had the option of including two additional criteria for evaluating teacher performance as part of their Part 1 funds. First, they could award a teacher's on-going initiative, commitment, and professional involvement in activities that directly impact student achievement.[6] Second, they could award a teacher for working in a hard-to-staff subject area (defined as an area that was experiencing a critical shortage of teachers or has had high turnover rate).[7] As illustrated in Panel B of Table 1, 45 of the 99 schools developed GEEG plans based exclusively on the two required criteria, while 39 schools used a measure of teacher initiative in addition to the two required performance criteria. The remaining schools proposed plans that relied on the two required performance criteria and the hard-to-staff criteria, with or without a measure of teacher initiative.

TEA guidelines recommend that Part 1 awards should be at least $3,000 and no more than $10,000 per teacher. However, eligible-schools could opt out of this proviso by offering a brief justification in their grant application in favor of an alternative award distribution plan. The majority of GEEG schools designed and implemented pay for performance plans that offered minimum and maximum awards of less than $3,000 per teacher. The proposed and actual distribution of GEEG awards are discussed in greater detail in Section 4.1 of this chapter.

GEEG program guidelines stipulate that Part 2 funds may be used on incentives for school personnel who contributed to improving student performance and who did not receive Part 1 awards.[8] Part 2 funds could also be used for professional development activities, signing bonuses, teacher mentoring programs, new teacher induction programs, funding for feeder schools, or any other professional program that directly contributes to improving student performance. Fifty-seven

GEEG schools used some or all of their Part 2 funds to provide awards to teachers eligible for Part 1 bonuses, thus making available to eligible teachers a larger pot of award money.

## 3. DATA AND SAMPLE

The data for this study come from three primary sources. Information on characteristics of schools' GEEG plans are obtained from data collected and maintained by the National Center on Performance Incentives (NCPI) at Vanderbilt University as part of their contract with TEA to evaluate the GEEG program. NCPI's research team reviewed GEEG plans described in applications submitted to TEA by each of the 99 participating schools, and recorded information on the amount of total school grant, proposed minimum and maximum award amounts for individual teachers, indicators used to measure teacher performance, and models used to distribute teacher awards. All applications were independently reviewed and coded by two research assistants, and subsequently checked by a third person to ensure accuracy. NCPI also surveyed all GEEG schools to collect data on the processes schools used to develop and approve plans, as well as supplemental information about plan features that were not clearly described in applications schools submitted to TEA.

Data on the distribution of actual bonuses awarded to teachers were collected by TEA using a secure, online data upload system. Following the distribution of teacher awards in fall 2006, schools recorded the actual amounts awarded to each teacher. These data were extensively audited by researchers at both TEA and NCPI and then match merged with administrative personnel records in Texas' Public Education Information Management System (PEIMS).

Eighty-five of the 99 GEEG schools provided information on actual award amounts distributed to teachers in the fall of 2006. Five elementary schools, six middle schools and three secondary schools did not submit data on award amounts distributed to teachers despite repeated

reminders from both TEA and NCPI staff. Non-respondent schools are not systematically different from respondents with respect to student ethnicity or student socio-economic status, nor are there significant differences in response rates between high-performing and high-improving schools. Furthermore, respondent schools do not systematically differ from non-respondents with respect to any of the specific program characteristics considered in this analysis. However, non-respondent schools are significantly larger, on average, than respondent schools.

Data on school, teacher and student characteristics were extracted from Texas' Academic Excellence Indicator System (AEIS) and confidential PEIMS files maintained by the TEA. AEIS and PEIMS data cover GEEG schools, schools participating in other state-funded teacher pay for performance programs, and schools that are not participating in a state-funded pay for performance program.[9]

GEEG schools are systematically different from other schools in Texas with respect to student characteristics and school locations. By design, GEEG schools serve a higher share of economically disadvantaged students. Coincidentally, they also serve a student population that is disproportionately urban and Hispanic.[10] Twenty-eight of the 99 GEEG schools are located in three large urban school districts – Houston ISD, Brownsville ISD, and Dallas ISD.

However, GEEG schools are reasonably similar to other public schools in Texas with respect to observable characteristics of the teacher workforce. Teachers in GEEG schools had similar average years of experience (11.0 years vs. 11.5 years) as other teachers in the state. Teachers in GEEG schools were slightly less likely to hold advanced degrees (19.3 percent vs. 22.0 percent) and the campus-level teacher turnover rate was somewhat lower in GEEG schools than in other schools in the state (17.6 percent vs. 21.3 percent)..[11] Average teacher salaries are about $750 per year higher in GEEG schools ($43,737 vs. $42,992), which may reflect the fact that GEEG schools are disproportionately urban.

## 4. RESULTS

This section addresses each of our research questions in turn. Thus, the first subsection describes the award plans and compares their design features to those reported in other pay for performance programs. The second subsection explores the relationship between teacher characteristics and the actual dollar amount of GEEG incentives awarded to teachers. The third subsection presents a set of analyses examining the predicted probability that plan characteristics and actual award distributions implemented at a GEEG school are associated with selected student, teacher, and/or school characteristics.

### 4.1. *How did schools propose to distribute awards to teachers and how did GEEG schools' award distribution plans play out in practice?*

Schools adopted more than 20 different indicators to evaluate a teacher's performance on the two criteria required by GEEG program guidelines (i.e., student achievement and teacher collaboration). Select indicators include teacher and/or student attendance, student drop-out rates, student performance on standardized assessments, team-based instructional planning activities, and participation in teacher induction programs. To further explore the plans implemented as part of the GEEG program, this section reports on the units of accountability for evaluating teacher performance, the approaches identified in GEEG grant applications for measuring student performance, and the proposed and actual distribution of teacher awards.

*Units of Accountability and Measures of Student Performance*. Although GEEG program guidelines favor individual incentives over group incentives, the empirical literature on optimal incentives is mixed on the subject. Freeman and Gelber (2006) conclude that individual incentives are systematically more effective than group incentives, while Chillemi (2008) finds that

group incentives are more effective than individual incentives when workers care about their co-workers material benefit. Encinosa, Gaynor and Rebitzer (2007) find that individual incentives induce greater work intensity than do group incentives for large groups, but not for small ones.

The GEEG plans are also mixed. Most GEEG schools designed plans that relied, at least in part, on individual incentives. Table 2 reports on the units of accountability and the measures of student performance for 97 of the 99 schools participating in the GEEG program. (Two schools are not included due to incomplete information in their program application.) Units of accountability indicate the type of incentives provided by the plan. Plans are classified according to whether they provide campus-wide incentives, team incentives, individual teacher incentives or some combination of campus, team, and individual incentives. Measures of student performance are reported as student attainment, student growth or a combination of the two.

Insert Table 2 Here

At Table 2 illustrates, 46 schools considered student performance exclusively at the teacher level when determining GEEG awards. Another 17 schools used both the teacher unit and a more aggregate unit (e.g., grade and/or school) to evaluate whether a teacher or set of teachers received an award. Slightly less than one-third of schools participating in the GEEG program relied exclusively on group performance for determining teacher awards.

As the table also illustrates, most GEEG schools devised incentive plans that rewarded teachers for the level of student performance. Nearly two thirds provided incentives to teachers whose students reached designated performance levels. Only 11 of the 97 schools designed plans that exclusively rewarded gains in student performance.

Table 3 uses a similar taxonomy to describe other domestic and international pay for performance programs. The list is restricted to programs that have been studied using a conventional treatment and control evaluation design, with pretreatment data on student

performance for both groups.[12] As in Table 2, the units of accountability include teacher, team, school, or some combination of the three. The measures of student performance for evaluating teachers include student test score gains and levels, as well as a number of other indicators such as teacher and student absenteeism, student promotion, and student participation in advanced courses. A comparison between tables 2 and 3 quickly demonstrates that GEEG program schools represent the full range of previously analyzed program types.

Insert Table 3 Here

*Proposed Distribution of Teacher Awards*. Figure 1 displays the range of award amounts specified in GEEG grant applications submitted to TEA. Each vertical bar represents a single school. The lower end of each bar is the minimum designated award under that school's GEEG plan, while the upper end of the bar indicates the maximum award proposed by that school. The minimum award amount is defined as any value other than $0 that a teacher can earn as part of their school's GEEG program; that is, if a teacher met only the criteria for earning the minimum award identified in the school's grant application, that teacher would receive the designated minimum award amount. The maximum represents the total award amount that a teacher can earn if he or she met all possible award criteria laid out in the GEEG plan. Six schools are not represented in the figure because we could not reliably determine the minimum and maximum awards proposed by those schools.

Insert Figure 1 Here

The distribution of awards proposed in GEEG grant applications varies considerably, both within and between schools. Twenty-two schools designed GEEG plans where the maximum plan award equals the minimum plan award, meaning a teacher reaching a predetermined performance threshold receives the same award regardless of the degree to which they performed above that standard. Six schools proposed minimum and maximum award amounts that had a range of more

than $4,000, one of which exceeded $9,600. The average difference between the proposed minimum and maximum awards in GEEG plans is $1,615.

Figure 1 also indicates most schools proposed an award distribution structure that does not align with the minimum and maximum dollar amounts recommended in GEEG program guidelines. TEA guidelines advise that Part 1 incentives should be at least $3,000 and no more than $10,000 per teacher, apparently under the assumption the minimum award must be large enough to elicit a response to the incentive plan. However, 75 schools proposed a minimum award of less than $3,000 in their GEEG grant application and almost half of all schools proposed a *maximum* award of less than $3,000.

Even though most acknowledge a monetary performance award must be perceived as large enough to motivate teachers, there is very little definitive evidence to guide decision makers on the optimal size of awards. The experimental economics literature, for example, suggests higher award payoffs lead to greater effort, but also that multiple prizes can be more effective than a single large prize that most employees have little chance of winning.[13] Furthermore, the optimal incentive structure appears sensitive to the amount of information workers have about their performance relative to other workers. When workers are not aware of the abilities of other participants, a larger prize is more likely to elicit the greatest effort among employees. However, if workers have a chance to observe other potential recipients in action, some workers may reasonably conclude that they have little or no chance of winning and therefore will not respond to a winner-take-all incentive, no matter how large. Under those conditions, the optimal incentive system needs to include an array of intermediate awards to elicit more total effort from employees.

Since the range between the minimum award and the maximum award can be misleading if there are teachers who do not receive an award under a school's GEEG plan, we turn to the Gini coefficient, to measure the dispersion of GEEG awards. A Gini coefficient, which is a common

ratio measure of income inequality, ranges from zero to one. A value of zero means all teachers receive exactly the same award (i.e., the distribution is perfectly equal), while a value of one means only one teacher receives an award (i.e., the distribution is perfectly unequal).

We calculate a Gini coefficient for the proposed distribution of Part 1 funds (i.e., Plan Gini) as well as for the actual distribution of Part 1 funds (i.e., Actual Gini). The Plan Gini corresponds to the most unequal distribution of awards possible, given the award parameters identified in the plan application a school submitted to the TEA and the total amount of Part 1 funds the TEA awarded to that school. The most unequal distribution that exhausts the Part 1 funds occurs when the total amount of Part 1 funds is distributed across teachers so that as many teachers as possible receive the maximum designated award, one teacher receives any residual Part 1 funds (which would necessarily be less than the maximum award), and the remaining teachers received no award at all.[14] The Actual Gini coefficient summarizes the distribution of Part 1 awards among teachers who could have qualified for a Part 1 award because they taught full-time in a GEEG school during the first year of the program (the 2005-06 school year).

Figure 2 displays the distribution of Plan Ginis for the 94 GEEG schools for which it was possible to determine a maximum proposed award for teachers.[15] The sample mean for the Plan Gini coefficient is .34, with the highest value on a Plan Gini coefficient being 0.77. Three schools have Plan Ginis of 0.00 (i.e., perfect equality), meaning that every teacher could receive the maximum proposed award.

Insert Figure 2 Here

The distribution of Plan Ginis suggests that the maximum potential inequality of GEEG award plans is less than the inequality of the distribution of income in the United States (0.42 in 2005[16]), but markedly greater than the inequality of teacher salaries within the 99 schools participating in the GEEG program. .(Gini coefficients for the distribution of total teacher pay in

2005-06 school year in GEEG schools ranged from 0.04 to 0.16, with a mean of 0.09.) Only nine GEEG schools (seven elementary schools and two high schools) had Plan Ginis that were lower than their Gini coefficients for teacher pay, meaning the award distribution plan identified in their GEEG grant application is more egalitarian than the base teacher salaries within their school.

The award distribution schemes proposed in GEEG grant applications further indicate that a handful of schools may be unable to fully implement their plan as originally conceptualized.[17] None of the 22 GEEG schools with a proposed award range of zero had a Plan Gini of 0.00, meaning no school where the minimum proposed award equals the maximum proposed award had sufficient funding to give all teachers an award if all teachers met those plans' predetermined performance thresholds. Similar flaws in the design and management of pay for performance systems have compelled schools and school systems to abandon teacher compensation reforms due to a lack of confidence in the program among stakeholders.[18] A fixed-tournament incentive system, wherein the winner or winners take all, can mitigate unknown financial exposure, though this type of system is believed to threaten team production by reducing teacher cooperation because teachers within school may be competing for a limited number of awards.[19]

*Actual Distribution of Teacher Awards*. The timing of implementation of the GEEG program meant teacher awards were retroactive during the first-year of the three-year program. GEEG plans submitted to the TEA were approved by TEA at the end of the 2005-06 school year, the same school year in which teacher performance was evaluated to determine their first award eligibility. Thus, the actual distribution of awards in the first award cycle should largely reflect the GEEG plans that teachers designed for themselves, and should not be confounded by behavioral responses to the plan itself.

Figure 3 displays the distribution of Part 1 awards pooled across all teachers and schools, conditional upon a teacher receiving an award for his or her performance during the 2005-06 school

year. Fourteen schools did not provide the actual award amounts distributed to teachers, thus information displayed in Figure 3 includes actual award data for 85 percent of schools participating in the GEEG program. Awards ranged from a low of $75 to a high of $15,000, with most teachers awarded between $1,000 and $3,000. Almost 80 percent of the teachers who earned an award from Part 1 funds received less than $3,000.

Insert Figure 3 Here

Forty-three percent of GEEG schools distributed awards from Part 1 funds that exceeded the maximum dollar amount specified in their application submitted to TEA. For example, although the proposed maximum award in one high school was less than $11,000, three teachers in that school received $15,000 each, while the other eight full-time teachers did not receive an award. This pattern suggests some schools resorted to contingency plans to distribute grant balances among those teachers meeting the performance criteria thresholds if too few teachers qualified for a bonus. Contingency plans are a required element of the GEEG program since grants awarded to schools must be spent prior to the close of the fiscal year. Schools may turn to a contingency plan for a number of reasons, including if the performance standard was set too high or the minimum and maximum bonuses were set too low.

The share of teachers in GEEG schools receiving a performance award from Part 1 funding in fall 2006 ranged from 36 to 100 percent, with a sample mean of 78 percent. Interestingly, 70 of the 624 full-time teachers who were new to a GEEG school in the fall of 2006 received Part 1 awards (30 campuses made such awards), even though awards were based on evaluations of the prior year's accomplishments. While awarding a teacher new to the school was permitted under program guidelines, the actual distribution of awards may be suggestive of an egalitarian view toward pay for performance policies in these schools. On the other hand, awarding a teacher new to the

school may speak to the many complexities associated with designing, implementing, and managing a pay for performance program.[20]

We also studied the relationship between a school's proposed and actual distribution of Part 1 funds by comparing their Plan Gini coefficient with their Actual Gini coefficient (see Figure 4). As illustrated in Figure 4, the distribution of actual awards had higher Gini coefficient values than Gini coefficient values for the proposed distribution of awards in 49 of the 80 schools for which we have data on both the proposed and actual distribution of GEEG awards.[21] This indicates that the distribution of actual awards in about 61 percent of schools is less egalitarian than the least egalitarian plan possible given the GEEG grant applications submitted to TEA.

Insert Figure 4 Here

*Comparisons of Award Amounts to Other Pay for Performance Programs*. On average, the award amounts individual teachers received as part of their school's GEEG plan are comparable to the size of the average performance award distributed to a teacher working in the average public school district that offers some type of financial award based on performance. Roughly 13 percent of public school districts in the United States operate some form of a performance incentive program during the 2003-04 school year, and the average size of an award payment was $2,005 for a traditional public school teacher, or the equivalent to 4.6 percent of the average base salary. While the actual dollar amounts of award payments are virtually identical for the average public charter school teacher ($2,024), award payments in charter schools account for a modestly larger percentage of the average charter school teacher's base annual salary (5.7 percent) .[22]

There also appears to be considerable differences with respect to sizes of the minimum and maximum awards reported in evaluations of pay for performance programs. As displayed in Table 3, in the United States, the average award payment tends to be below $3,000, with minimum awards ranging from $250 to $2,500, and maximum awards ranging between $1,000 and $10,000.

International programs tend to follow a similar pattern as becomes evident when examining the size of awards as a percentage of monthly salary.

Pay for performance programs where the unit of accountability is set at the school-level typically report a smaller maximum award than those programs using a teacher or team of teachers as the evaluation unit. This may speak to the diseconomies of scale when rewarding an individual opposed to a group of individuals. An exception is the random-assignment study in the Indian state of Andrea Pradesh evaluated by Muralidharan and Sundararaman (2008) where teachers evaluated based on group performance were eligible for similar bonus amounts as teachers evaluated on their individual performance to permit valid comparison of incentive effects between team- and individual-level conditions. Ultimately, the authors found that the group incentive program had a smaller positive effect than the individual level incentive condition while both incentive conditions outperformed comparison schools that received no incentives and schools that received additional paraprofessional teachers and school grants for spending on school resources. Among GEEG schools, there was no significant difference in maximum awards, whether proposed or realized, between schools where the unit of accountability was the school, and schools where the unit of accountability was the teacher.

### 4.2. *What is the relationship between teacher characteristics and the actual dollar amount awarded to teachers as part of their school's GEEG plan?*

To explore the relationship between observable teacher characteristics and the dollar amount awarded to teachers, we estimate Probit, ordinary least squares (OLS), and Tobit models of the individual teacher awards. The Probit analysis estimates the probability that a teacher received an award, while the OLS and Tobit analyses examine the size of such awards. The dependent variable for the Probit analysis is a binary variable indicating whether a teacher received a Part 1 GEEG

award at all. The dependent variables for the OLS and Tobit models are the dollar amount of the teacher's actual Part 1 award.[23] The regression sample includes 85 GEEG schools and 3,245 full-time teachers employed in those schools during the 2005-06 school year.

*Probability a Teacher Receives a GEEG Award*. The first model reported in Table 4 presents results from a Probit analysis on the probability that a teacher received a GEEG award. For ease of exposition, the table reports marginal effects. Thus, a coefficient estimate of -0.448 indicates that the probability of receiving a Part 1 GEEG award is 44.8 percentage points lower for a teacher who is new to the building than for a teacher who is not new to the building, all other things being equal. In other words, teachers who are new to the school during 2005-06 school year are significantly less likely to receive an award than teachers who were employed in the school during 2004-05 school year (i.e., the school year in which GEEG eligibility was determined). The lower probability of a newly arrived teacher receiving a GEEG award does not appear to reflect bias against newly minted teachers, however. Less than half of the teachers who are new to a GEEG school are also new to teaching and there is no relationship between years of experience and the probability of receiving an award.[24]

Insert Table 4 Here

The values on the coefficients from the Probit model show bilingual education/ESL teachers, language arts teachers and teachers with self-contained classrooms in TAKS grades were significantly more likely to receive GEEG awards.[25] Considering student assessment measures are not available in all grades and subjects, particularly in fine arts and vocational courses, it is possible some teachers are not eligible to receive Part 1 bonuses in a school's GEEG plan. Furthermore, it is worth noting that some schools implemented multiple measures for evaluating a teacher's impact on student performance, some of which are more easily applied to all teachers regardless of their

specialization (e.g., student dropout, student attendance, and teacher absenteeism) than are student achievement results from a standardized assessment.

The value on the mathematics coefficient from the Probit model is an anomaly to this characterization. Even though a mathematics assessment is administered to students annually in grades 3 to 11, math teachers are no more likely than non-math teachers to receive a GEEG award, holding all other things equal. However, there may be insufficient variation in the data to detect an independent effect for math teachers since all but eight of the 518 math teachers in GEEG schools are also either bilingual/ESL teachers, language arts teachers or self-contained classroom TAKS teachers.

***Award Amounts Received by Teachers.*** The second and third models in Table 4 report results on the relationship between observed teacher characteristics and award amounts received by a teacher. Tobit analysis is more appropriate for censored data, so it is the preferred specification for this set of analyses.[26] Nonetheless, as displayed in Table 4, the results from both the OLS and Tobit analyses are qualitatively similar to one another and reinforce the general conclusions of the Probit analysis.

Results from the OLS and Tobit models indicate teachers who are new to a GEEG school during 2005-06 school year received less than other teachers with similar educational attainment and experience. Similar to the Probit model, however, this pattern does not appear to reflect a bias against beginning teachers. There is no evidence that highly experienced teachers received higher awards than less experienced teachers.[27] Furthermore, there is no evidence that teachers with advanced degrees earned larger awards than other teachers.[28]

Estimates based on the dollar value of the individual awards reveal more about the relationship between teaching assignments and the GEEG award distribution than is evident from the Probit analysis. The analysis of award amounts confirms that teachers in tested grades and

subjects received significantly larger awards than other teachers. Teachers with self-contained classrooms in TAKS grades received by far the largest GEEG awards, all other things being equal. Teachers in language arts, bilingual education/ESL and mathematics received significantly higher incentive awards than other teachers, but significantly less than those received by TAKS teachers. On average, the 270 fine arts teachers in the analysis received the smallest GEEG awards. Intriguingly, the models suggest that math teachers receive higher awards than other teachers, but have no greater probability of receiving an award. This implies that when math teachers qualified for a GEEG award, the average size of their award was larger than that of their peers.

Taken as a whole, the relationship between observable teacher characteristics and the dollar amount awarded to teachers in GEEG schools appears to reflect factors other than those rewarded by the traditional single salary schedule. The single salary schedule rewards teachers based on years of experience and degrees held. However, those two factors – separately or jointly – have no influence on the probability that a teacher receives a GEEG award or the size of the award that a teacher receives.

### 4.3. *What are the determinants of plan characteristics and the distribution of awards?*

To investigate determinants of GEEG plan characteristics and the distribution of awards, we draw on the literature to identify a number of teacher and school characteristics that could be associated with the GEEG plan adopted at a particular school. We then examine if these observable characteristics explain the variation in three key aspects of GEEG plans, including the unit of accountability for determining a teacher's award eligibility, the approaches for measuring student performance, and the equity of proposed and actual teacher awards. Each subsection briefly describes the dependent variables and basic modeling strategy and then reports on key findings.

*The Likely Determinants of Plan Characteristics*. We incorporate several school, teacher, and GEEG plan characteristics into our analysis of the determinants of each school's GEEG plan. The school determinants include the share of economically disadvantaged students, school type (elementary and secondary) and school size. The teacher determinants include the average years of teacher experience, the share of teachers who are male, the share of teachers who are new to the building and a Gini coefficient for teacher salaries. The salary Gini summarizes the distribution of teacher base pay, and therefore indicates the homogeneity of the teacher corps with respect to the determinants of base pay—experience and educational attainment. When all of the teachers share the same step on the salary scale, the salary Gini equals zero. As teacher characteristics become more dispersed, the salary Gini increases. The GEEG plan determinants are the level of GEEG funding per pupil and an indicator for whether the school was GEEG eligible for being a high improving school.

We include the share of economically disadvantaged students in all models based on studies indicating incentive pay plans with more egalitarian award distributions are likely to develop where it is harder to attribute differences in student performance to differences in teacher effectiveness. Although all GEEG schools have more than a threshold share of economically disadvantaged students, there remains substantial variation in this variable, and those schools with the highest shares of economically disadvantaged students are more homogeneous with respect to an important determinant of student performance than other GEEG schools. However, because the share of economically disadvantaged students is a function of grade level, this indicator must be evaluated jointly with the indicators for school type (elementary school and high school). We include the school type indicators because two recent surveys both find that elementary school teachers are less supportive of teacher pay for performance programs than are secondary-level teachers.[29]

We included variables for school size and a measure of teacher homogeneity (the teacher salary Gini coefficient) because studies suggest that small groups are more likely to adopt egalitarian incentive structures than large groups,[30] and that the median teacher would reasonably prefer a more egalitarian structure if she had full information about the abilities of other teachers (as would be more likely in a small school) and there were significant variation in those abilities.[31] The salary Gini is intended to capture the potential for such variations.

We include both the share of teachers who are male and the average years of teaching experience because the literature suggests that perspectives on pay for performance plans vary by gender and experience.[32] For example, Niederle and Vesterlund (2007), find that even when there are no gender differences in performance, men are twice as likely as women to choose an incentive scheme that rewards individual performance.[33] Self-report data from teachers further indicates that female teachers have more negative impressions of pay for performance programs than male teachers.[34] In addition, several studies on teacher attitudes toward performance-pay policies conclude that beginning teachers are more accepting of performance-pay than are more experienced, veteran teachers.[35]

We include the share of teachers who are new to the building because those characteristics were strong predictors of individual teacher awards, and schools with a large number of new teachers may therefore have more individualistic award schemes. We include GEEG funding per pupil to allow for the possibility that schools with more generous per-capita funding might be more willing to spread the wealth around. Finally, we include an indicator for high improving schools because such schools arguably have more room for improvement than high performing schools, and might adjust their incentive plans accordingly.

*Units of Accountability for Teacher Awards.* To predict if teacher and school characteristics are associated with the units of accountability identified in GEEG plans for

determining a teacher's award eligibility, we categorize GEEG schools into three groups: (1) those who use campus-level performance only; (2) those who use teacher-level performance only; (3) and those who use some combination of the two. Schools using teams as a unit of accountability are categorized into the latter category, while those who use campus-level performance only are the referent group in the multinomial logit model. In total, our sample includes 32 schools in the campus-level performance only group, 47 schools in the teacher-level performance only group, and 15 schools in the campus- and teacher-level performance group.

Table 5 (Panel A) presents results when predicting if teacher and school characteristics are associated with the unit of accountability identified in GEEG grant applications for determining a teacher's award status. The evidence suggests that as teachers become more dissimilar (at least with respect to salary and its determinants) there is an increasing probability that those schools' plans will incorporate incentives for individual teachers. The model predicts that schools where the teachers are highly similar (i.e., with a teacher salary Gini at or below 0.065 which is the 10$^{th}$ percentile for this indicator) are more than three times more likely to rely exclusively on campus-level incentives than are schools where the teachers are highly dissimilar (i.e., with a teacher salary Gini at or below 0.127 which is the 90$^{th}$ percentile for this indicator).[36]

There are no systematic differences across the three accountability categories with respect to the other determinants in the model. Given teacher homogeneity, there is no evidence of differences across school types (elementary, secondary and other) or school size with respect to the chosen units of accountability. High improving schools, schools with more experienced teachers and schools with a higher share of teachers who are new to the building are also no more likely than other schools to favor incentives for individual teachers.

*Approaches to Measuring Student Performance.* A second set of analyses categorized schools into three groups according to the approaches for measuring student performance proposed

in their GEEG grant application: (1) those who use performance growth only; (2) those who use performance levels only; and (3) those who use both performance growth and performance levels. Fifty-three schools relied exclusively on performance levels. Another 12 schools rewarded exclusively growth, and the remaining 26 schools rewarded both performance levels and performance gains. Schools that rewarded both student achievement levels and student achievement growth are the referent group.[37]

As illustrated in Table 5 (Panel B), average teacher experience has a significant influence on the probability that a GEEG plan rewards student growth rather than achievement levels. The evidence suggests that the lower the average teacher experience, the more likely that the school relies solely on measures of student growth, and the less likely the plan incorporates achievement level measures. For example, the model predicts that a school where the average teacher has 5 years of experience is nearly 7 times more likely to design a plan that rewards growth only than a school where the average teachers has 15 years of experience. (The predicted probabilities are 28.3 percent and 4.1 percent, respectively.)

There is no evidence that the other determinants in the model have a significant influence on the plan's measure of student performance. Given the high degree of collinearity between the percentage of economically disadvantaged students and a school's grade level, we also estimated both student socioeconomic status and grade level jointly. We found no evidence that differences in these indicators change the probability that a school rewards achievement levels rather than measures of growth. Similarly, there is no indication that school size or GEEG per-pupil funding has any influence on performance analysis strategies in use by schools.

*Equality of Proposed and Actual Awards*. The final set of analyses investigated determinants of award equality using a simple regression model identified in the economics literature on optimal incentives. We use three indicators of award equality: (1) the Plan Gini coefficients; (2)

the Actual Gini coefficients; and (3) the share of teachers receiving no award. Table 5 (Panel C) displays results from examining the issue using each of these three indicators of award equality.

In all three cases, the share of economically disadvantaged students is jointly significant at the 10-percent level with the indicators for school type. Results reported in Panel C further suggest that schools with more economically homogeneous student bodies have more egalitarian award plans. Contrary to expectations based on the survey literature, the analysis provides no evidence that a relative distaste for performance pay among elementary school teachers leads to systematically more egalitarian GEEG plans in elementary schools.

The literature also implies that teachers would favor more egalitarian plans when they had a reduced expectation of winning a winner-take-all tournament—as would be the case where there was a greater variation in abilities. If true, then the evidence suggest that a variation in teacher salaries does not signal a greater variation in teacher abilities. As displayed in Table 5 (Panel C), schools where teacher are more homogeneous with respect to salary devise GEEG award distribution models with greater equality than their counterparts.

Larger schools also have less egalitarian plans than small schools, although the evidence is less transparent. School size is highly and inversely correlated with GEEG funding per pupil. School size and school funding per pupil are jointly significant in all three models, and in all three cases a marginal increase in school size significantly increases the inequality of the awards distribution across a range of school sizes.[38]

As the literature would predict, our analyses find that schools with more experienced teachers are more likely to have more egalitarian incentive plans, although the effect is not significant for the Plan Gini. However, contrary to the predictions of the literature, there is no evidence that schools with a higher share of male teachers adopt more individualistic incentive plans.

The share of newly hired teachers is entered into the regressions to capture the possibility that schools with a greater share of newly hired teachers might reasonably be expected to distribute their awards less evenly. The evidence in Panel C provides mixed support for this hypothesis. The share of new teachers had a significant and positive influence on the Actual Gini, but not on the other two indicators. In addition, we find no evidence that schools eligible for GEEG based on high accountability ratings design more egalitarian plans than those eligible by Comparable Improvement.

## 5. CONCLUSION

This study focused on characteristics and determinants of teacher pay for performance plans implemented at 99 traditional public and public charter schools in Texas participating in the GEEG program. The GEEG program provides an ideal setting to study the nature of compensation reforms that educators perceive to be acceptable. We found that GEEG plans varied considerably in terms of the criteria used to identify high-performing educators as well as the level at which teachers were held accountable (i.e., individual, team, school, or some combination thereof), and the degree of equality in their awards distributions.

There was a striking commonality among plans, however. Most of the incentive plans rejected TEA guidelines favoring a small number of relatively large awards. Nearly 80 percent of eligible teachers in GEEG schools received an incentive award, and most of those received an award substantially less than the $3,000 minimum award recommended by TEA. The average award received by a GEEG teacher was strikingly similar in magnitude to the average incentive award reported nationwide by participants in the Schools and Staffing Survey for 2003-04 school year.

Our analysis of the GEEG program plans suggests that teachers tend to design relatively egalitarian incentive plans for themselves. In turn, this observation suggests a possible policy

tension between incentives that are strong enough to elicit a behavioral response from teachers, and the need for teacher buy-in to such plans. Future research on teacher pay for performance plans needs to explore more fully the behavioral changes caused by differing levels of a monetary award, similar to dose-response studies in the medical literature.

Our results suggested that bilingual education/ESL teachers, language arts teachers and teachers with self-contained classrooms in TAKS grades were significantly more likely to receive GEEG awards, and those teachers in grades and subjects covered by the TAKS test received significantly larger awards than other teachers. We presume this is due to the fact that student assessment measures are not available in all subjects, thus some teachers may have found it difficult to provide objective evidence of improving student performance, as required by the TEA program guidelines. This finding may also be suggestive of a limitation frequently noted about the current state of knowledge on performance-pay plans in the education sector, that is, the present capacity for designing plans that include multiple means of measuring performance so that all educators have the opportunity to earn an award regardless of the subject or grade they teach or position they hold within a school.

Several teacher and school characteristics were associated with GEEG plan characteristics and the distribution of awards. In particular, the distribution of teacher experience and the level of teacher experience had a significant influence on plan design. The more dissimilar the composition of teachers within a school (at least with respect to teacher salary) the less likely their GEEG plan awards teachers based on campus-level performance, and the more unequal the distribution of incentive awards. Schools where average teacher experience is lower have less egalitarian incentive plans and were more likely to implement pay for performance plans that reward teachers for student growth opposed to attainment. This influence of school-wide measures of teacher experience on plan design is particularly striking given that we find no evidence that the experience or education

attainment of individual teachers had any impact on the probability they received an award or the magnitude of that award.

Policymakers have become more and more focused on teacher compensation reform to enhance academic opportunities and outcomes of public elementary and secondary school children in the United States. However, research on the topic frequently notes that teacher compensation reforms are often short lived when teacher engagement and buy-in around plan design are absent. While failure to successfully implement and sustain teacher compensation reforms could also be attributed to many other factors, this study offers important insight into design features of performance-pay plans that educators may perceive to be reasonable. We also examined the association between teacher and school characteristics and the characteristics of the GEEG plan implemented at a particular school to better understand if some groups of educators may perceive particular design features of performance-pay plans as more attractive. This information may prove useful as practitioners, researchers, and policymakers explore the utility of teacher pay for performance policy to improve administrator and teacher productivity, recruit more qualified teaching candidates, and enhance learning opportunities.

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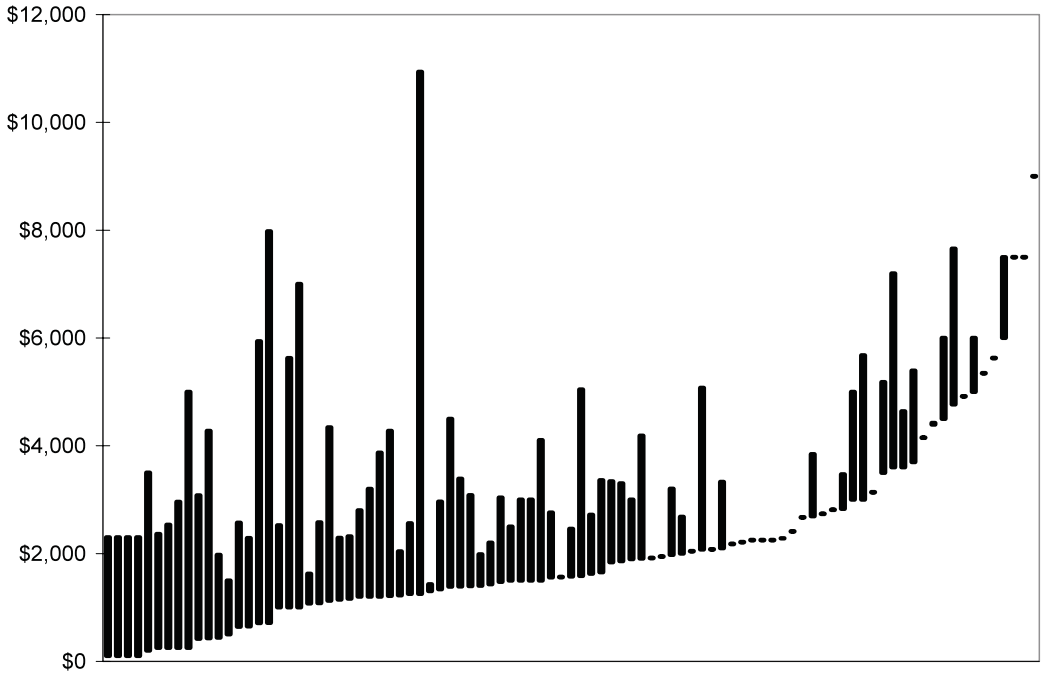
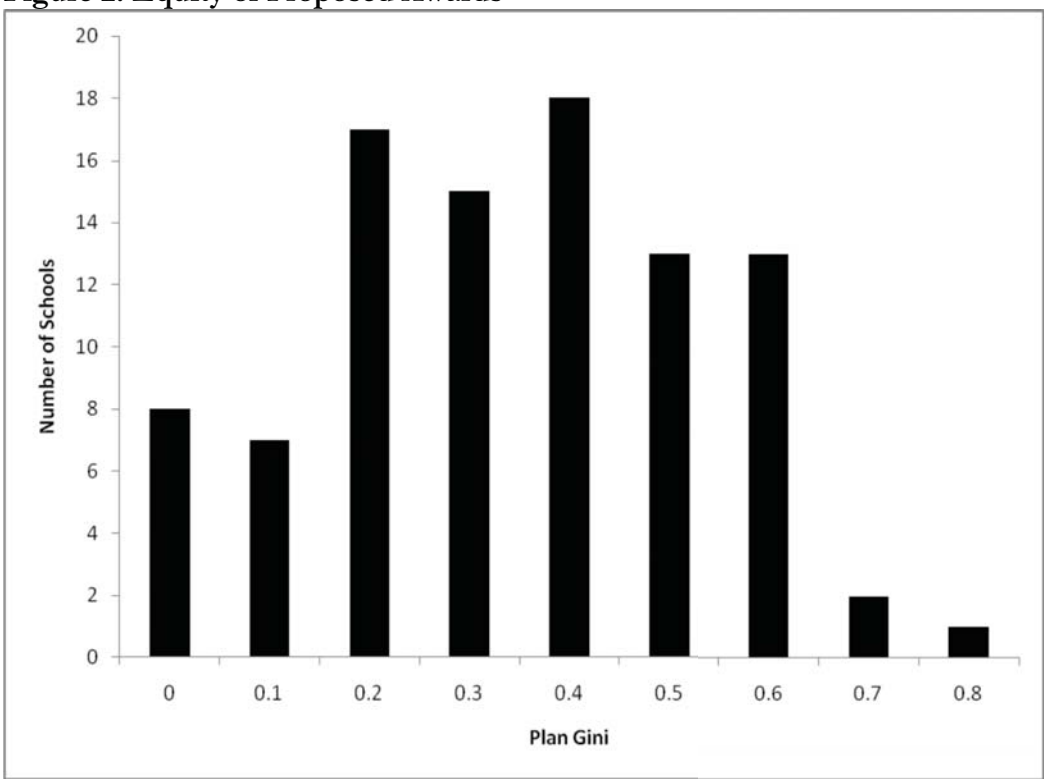
**Figure 1: The Distribution of Minimum and Maximum Proposed Awards**



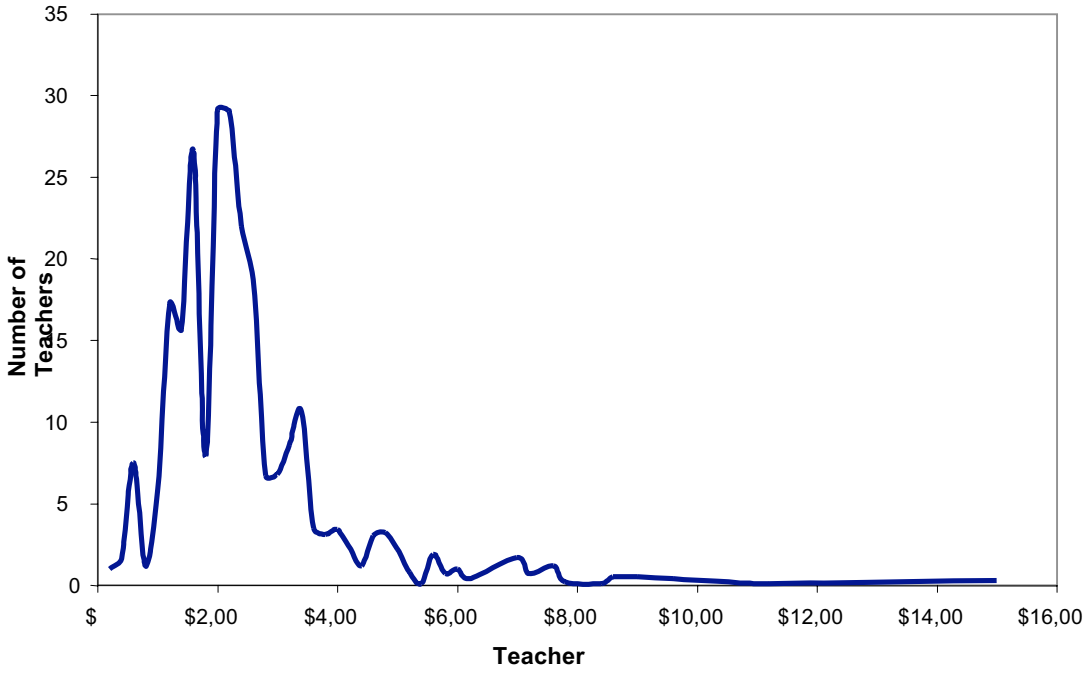

*Source:* Proposed GEEG teacher award information collected during fall 2006 by coding GEEG plan applications submitted to the Texas Education Agency.

**Figure 2: Equity of Proposed Awards**



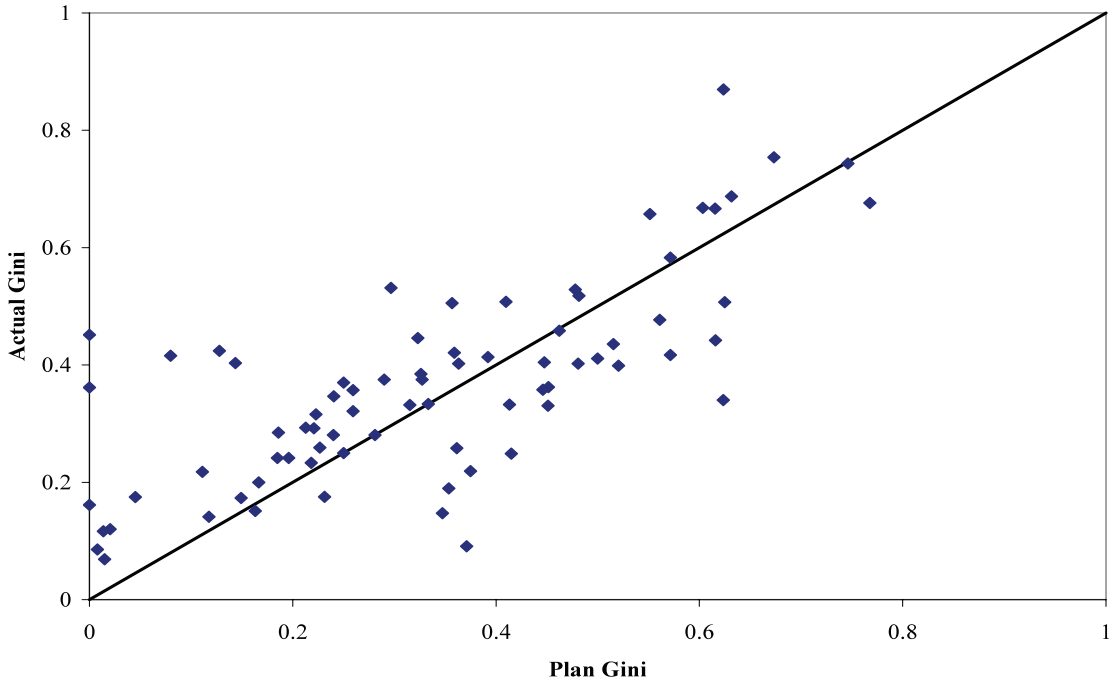

*Source:* Plan Gini derived from proposed GEEG teacher award information collected during fall 2006 by coding GEEG plan applications submitted to the Texas Education Agency.

**Figure 3: Actual Distribution of Awards from Part 1 Funding**




*Source:* GEEG teacher award information collected during fall 2006 using an online, secure data upload system.

**Figure 4: Comparing Plan and Actual Gini Coefficients for Awards**




*Source:* Plan Gini derived from proposed GEEG award information collected during fall 2006 by coding GEEG plan applications submitted to the Texas Education Agency. Actual Gini derived from GEEG teacher award information collected during fall 2006 using an online, secure data upload system.

**Table 1: Characteristics of GEEG Pay for Performance Plans**

**Panel A: Indicators of Student Performance**

| | Number of Schools |
|---|---|
| Comparable Improvement | 5 |
| Drop-out rate | 5 |
| Adequate Yearly Progress | 6 |
| Teacher attendance | 6 |
| Student attendance | 7 |
| Other | 16 |
| TEA campus ratings | 45 |
| Student assessments | 80 |
| Observations (schools) | 99 |

**Panel B: Performance Criteria for Rewarding Teachers**

| | Number of Schools |
|---|---|
| Required + Hard-to-staff areas | 1 |
| Required + Teacher initiative + Hard-to-staff areas | 14 |
| Required + Teacher initiative | 39 |
| Student performance + Teacher collaboration (Required) | 45 |
| Observations (schools) | 99 |

*Source*: Information adapted from Springer et al. (2007).

**Table 2: The Units of Accountability and Measures of Student Performance**

| | Levels | Growth | Both |
|---|---|---|---|
| Campus | 21 | 3 | 8 |
| Teacher | 28 | 6 | 12 |
| Grade-Level or Subject-Matter Team | 2 | 0 | 0 |
| Campus & Teacher | 7 | 2 | 6 |
| Campus, Teacher & Team | 2 | 0 | 0 |
| Observations (Schools) | | 97 | |

*Note*: Two schools are not included due to incomplete information in their program application.

*Source*: Information adapted from Springer et al. (2007).

**Table 3. Characteristics of Pay for Performance Programs in the United States and Abroad**

| | Period | Teacher Performance Measures | | | | |
|---|---|---|---|---|---|---|
| | | *Unit of Accountability* | *Measures of Student Performance* | *Minimum* | *Maximum* | *% Monthly Salary* |
| **United States** | | | | | | |
| Dallas, Texas' School Incentive Program | 1992 - 1995 | School | Multiple indicators, including student test score gains, student achievmeent levels, student attendance, student promotion, and accelerated course enrollments. | $450 | $1,000 | ≈ 39% |
| Merit Pay Program (Michigan) | 1996 - 1997 | Teacher | Student retention and student evaluation of teacher. | $1,000 | ≈ $5,000 | ≈ 12.5% - 75% |
| Little Rock, Arkansas' Achievement Challenge Pilot Project | 2005 - 2007 | Teacher | Student test score gains. | $350 | $7,600 | ≈ 7.8% - 175% |
| Teacher Advancement Program (TAP) | 1999 - present | Teacher and School | Student test score gains. | $2,500 | $12,000 | ≈ 45% - 216% |
| Texas Educator Excellence Grant Program (TEEG) | 2007 - present | Teacher, Team, and/or School | Multiple indicators, including student achievement levels, student test score gains, and student and teacher attendance. | $250 | $10,000 | ≈ 4.5% - 180% |
| **International** | | | | | | |
| Israel's Ministry of Education's School Performance Program | 1996 - 1997 | School | Number of credit units per student, student receiving a matriculation certification, and school dropout rate. | $1,000 | $2,500 | ≈ 30% - 75% |
| Kenya's International Christelijk Steuenfonds Incentive Program | 1998 - 1999 | School | Student test score gains and student achievement levels | $26 | $51 | ≈ 21% - 43% |
| Israeli Teacher-Incentive Experiment | 2001 | Teacher | Student achievement levels | $1,750 | $15,000 | ≈ 10% - 40% |
| Andra Pradesh Randomized Evaluation Project | 2006 - present | Teacher or School | Student test score gains | $2.25 | $450 | ≈ 33% - 50% |

*Sources*: Clotfelter & Ladd (1996); Ladd (1999); Winters et al, (2009); Springer, Ballou, & Peng (2008); Springer et al. (2008); Lavy, (2002); Glewwe, Ilias, & Kremer (2008); Lavy (2007); Muralidharan & Sundararaman (2008)

**Table 4. Teacher Characteristics as Determinants of Teacher Award Distribution**

| | Probit | OLS | Tobit |
|---|---|---|---|
| (model) | (1) | (2) | (3) |
| Years of Experience | 0.001 | 4.154 | 4.179 |
| | (0.00) | (14.28) | (18.46) |
| Experience, squared | 0 | -0.11 | -0.072 |
| | (0.00) | (0.46) | (0.58) |
| Experience missing | -0.037 | 207.666 | 200.937 |
| | (0.05) | (142.58) | (171.73) |
| BA | 0.124 | 9.23 | 326.425 |
| | (0.15) | (533.61) | (977.57) |
| MA | 0.067 | -60.025 | 187.806 |
| | (0.13) | (531.86) | (984.54) |
| Ph.D. | -0.008 | 129.136 | 283.82 |
| | (0.20) | (731.68) | (1232.34) |
| New to Building | -0.448 | -1,317.39 | -2,268.30 |
| | (0.053)*** | (132.980)*** | (317.541)*** |
| **Teaching Assignment** | | | |
| Language Arts | 0.086 | 292.414 | 433.609 |
| | (0.027)*** | (87.800)*** | (116.424)*** |
| Math | 0.037 | 326.967 | 405.267 |
| | (0.02) | (82.250)*** | (96.372)*** |
| Science | 0.002 | -273.288 | -305.438 |
| | (0.02) | (113.608)** | (130.200)** |
| Foreign language | 0.025 | 79.468 | 121.649 |
| | (0.05) | (158.49) | (230.01) |
| Fine arts | -0.111 | -363.611 | -611.781 |
| | (0.045)** | (99.383)*** | (157.546)*** |
| Vocational technical | -0.097 | -88.387 | -254.122 |
| | (0.09) | (233.71) | (383.23) |
| Special Education | 0.008 | 211.96 | 224.161 |
| | (0.04) | (154.61) | (211.39) |
| Bilingual | 0.127 | 387.162 | 573.781 |
| | (0.037)*** | (94.773)*** | (100.203)*** |
| TAKS self contained | 0.117 | 773.82 | 976.561 |
| | (0.031)*** | (127.558)*** | (172.526)*** |
| Constant | … | 1,379.94 | 661.851 |
| | … | (549.165)** | (1000.02) |
| Observations | 3245 | 3245 | 3245 |
| R-squared | … | 0.18 | … |

Robust standard errors in parentheses. For ease of interpretation, the probit coefficients and standard errors have been transformed into marginal effects at the mean.

* significant at 10%; ** significant at 5%; *** significant at 1%.

*Source*: Authors calculations.

**Table 5. Determinants of Plan Characteristics and the Distribution of Teacher Awards**

| | Panel A: Units of Accountability | | Panel B: Measuring Student Performance | | Panel C: Equity of Proposed and Actual Awards | | |
|---|---|---|---|---|---|---|---|
| | *Teacher and Campus* | *Teacher Only* | *Growth Only* | *Levels Only* | *Plan Gini* | *Actual Gini* | *% Teachers No Award* |
| (model) | (1) | | (2) | | (3) | (4) | (5) |
| Percent economically disadvantaged students | 0.069 | 0.003 | -0.1 | -0.015 | -0.006 | -0.003 | -0.003 |
| | (0.05) | (0.04) | (0.07) | (0.03) | (0.002)** | (0.00) | (0.002)* |
| Average teacher experience | -0.116 | -0.07 | -0.311** | -0.065 | -0.009 | -0.016 | -0.012 |
| | (0.10) | (0.10) | (0.14) | (0.08) | (0.01) | (0.007)** | (0.005)** |
| Teacher salary Gini | 27.006* | 31.390** | -15.548 | 2.89 | 2.808 | 2.342 | 2.042 |
| | (14.86) | (14.31) | (26.76) | (13.10) | (0.806)*** | (0.904)** | (0.784)** |
| School size | -0.117 | 0.968* | 0.102 | 0.012 | 0.084 | 0.022 | -0.039 |
| | (0.92) | (0.55) | (1.36) | (0.65) | (0.033)** | (0.03) | (0.02) |
| GEEG funding per pupil | -2.397 | 2.541 | 2.422 | -0.266 | 0.031 | -0.147 | -0.245 |
| | (3.79) | (2.00) | (5.80) | (3.43) | (0.09) | (0.081)* | (0.096)** |
| Share of teachers new to campus | 0.504 | 0.485 | -6.734 | -2.273 | 0.119 | 0.278 | 0.258 |
| | (3.65) | (2.47) | (4.34) | (2.27) | (0.17) | (0.149)* | (0.18) |
| Share of teachers male | 3.309 | 2.002 | 3.61 | -2.425 | 0.065 | -0.07 | -0.16 |
| | (2.29) | (2.65) | (5.64) | (2.74) | (0.15) | (0.14) | (0.14) |
| Elementary school | -0.279 | 0.854 | 2.02 | -0.808 | -0.056 | -0.068 | -0.052 |
| | (0.93) | (0.73) | (2.70) | (0.56) | (0.05) | (0.035)* | (0.04) |
| Secondary school | 0.908 | 0.182 | -0.973 | -1.032 | -0.099 | 0.049 | 0.058 |
| | (1.19) | (1.14) | (1.42) | (0.95) | (0.058)* | (0.04) | (0.05) |
| High improving school | -0.942 | 0.052 | 1.659 | -0.242 | -0.003 | 0.042 | 0.037 |
| | (0.73) | (0.56) | (1.25) | (0.43) | (0.04) | (0.03) | (0.03) |
| Constant | -7.315 | -9.588* | 9.679 | 4.463 | 0.191 | 0.48 | 0.745 |
| | (7.82) | (4.96) | (13.25) | (6.86) | (0.34) | (0.33) | (0.226)*** |
| Observations | 97 | | 97 | | 94 | 84 | 84 |
| Wald $Chi^2$ (20) | 48.46 | | 117.08 | | … | … | … |
| Probability of a Greater | 0.0004 | | 0 | | … | … | … |
| Pseudo $R^2$ | 0.1002 | | 0.1593 | | … | … | … |
| $R^2$ | … | | … | | 0.3 | 0.42 | 0.51 |

Robust standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%.

*Source*: Authors calculations.

[1] For a comprehensive overview of teacher pay for performance programs see the state-by-state resource map hosted by the National Center on Performance Incentives (http://www.performanceincentives.org/statebystate_resources/index.asp).

[2] GEEG application guidelines note, "Grant applications must validate significant teacher involvement in the development of the incentive program; valid examples of teacher involvement include attendance records, meeting minutes, or other evidence that indicates significant teacher involvement in the creation of the incentive program. Additionally, each application must include no less than three letters from teachers, outlining their involvement in the process and their support for the program." A school's application also had to be approved by the local education agency, and the local school board.

[3] Murnane, R.J., and Cohen, D. (1986). Merit pay and the evaluation problem: Why most merit pay plans fail and few survive. *Harvard Education Review*, 56, 1-17. Podgursky, M. and Springer, M.G. (2007). Teacher Performance Pay: A Review. *Journal of Policy Analysis and Management*, 26(4), 909-949.

[4] A registered alternative education campus could also be considered high performing if it had high passing rates on the Texas Assessment of Knowledge and Skills (TAKS) test. It did not have to meet the dropout rate standards required for Recognized or Exemplary status.

[5] A school could also be considered Recognized if 65 percent of the students passed in each subject and subgroup, and the school showed 'required improvement'. For more on the Texas accountability ratings, see TEA (2005).

[6] GEEG program guidelines further define teacher initiative as "a teacher's demonstration of ongoing initiative, commitment, personalization, professionalism, and involvement in other activities that directly result in improved student performance, for example, working with students outside of assigned class hours, tutoring, creating programs to engage parents, and taking initiative to personalize the learning environment for every student."

[7] Subjects identified include "…math, science, special education, technology, bilingual/English as a second language, foreign language, literacy instruction, or areas of need specific to the district" (Texas Education Agency, 2006).

[8] Athletic coaches cannot receive Part 2 funds.

[9] There are two other state-funded pay for performance programs, the Texas Educator Excellence Grants program (TEEG) and the District Awards for Teacher Excellence program (DATE). TEEG was initiated during the 2006-07 school year and provided funding for pay for performance plans to be implemented in more than 1000 additional Texas schools. TEEG schools had to meet similar eligibility criteria as GEEG schools, i.e., serve high percentages of economically disadvantaged students and be rated as high achieving or high improving on the Texas accountability rating system. For more information on the TEEG program, see Springer, M.G. et al (2008). Texas Educator Excellence Grant (TEEG) Program: Year One Evaluation Report. National Center on Performance Incentives Policy Evaluation Report. Nashville, TN.

[10] For more on the differences between GEEG schools and other Texas schools, see Springer et al. (2007).

[11] The turnover rate is defined as the fraction of teachers in 2005-06 school year who are not serving as teachers in the same school in 2006-07 school year

[12] Table 3 does not include Figlio and Kenny's (2008) national study on the impact of individual teacher performance incentives on student test score gains because the characteristics of the incentive programs vary considerably.

[13] See, for example, Freeman and Gelber (2006), Vandegrift, Yavas and Brown (2007), and Harbring and Irlenbusch (2003).
[14] The Gini coefficient for school k equals:

$$G = 1 + \frac{1}{N} - [\frac{2}{mN^2}]\sum_{i=1}^{i=n}(N - i + 1)y_i$$

where, $N$ is the number of teachers in school $k$, $m$ is the average award per teacher in school $k$, $y_i$ is the individual award of teacher $i$ in school $k$, and the teachers in school $k$ have been sorted from the teacher with the lowest GEEG award or no GEEG award ($y_1$) to the teacher with highest GEEG award ($y_N$).

To illustrate further, consider a scenario where a school has 11 full-time-equivalent teachers and received $45,000 in Part 1 funds to implement their GEEG plan with a maximum possible award of $6,000. If seven teachers earn the maximum possible award, there is enough award money remaining to give one teacher an award of $3,000 (45,000-7*6,000=3,000). The remaining three teachers receive nothing. The Plan Gini coefficient for this school would be 0.3151.
[15] Evaluators could not reliably calculate a plan maximum award for four schools. PEIMS data on the total number of teachers in the school were not available for the fifth school.
[16] U.S. Census Bureau 2006.
[17] We also found that three schools with a zero award range have above-average Plan Ginis, indicating the proposed award distribution plan is in fact less egalitarian than the average school in our sample.
[18] Hui and Khanna (2008) recently reported that, "Teachers at 82 percent of the schools across the [North Carolina] are eligible for bonuses this year because their schools met or exceeded expectations in the state's ABCs of Public Education testing and accountability program…But the number of eligible teachers so exceeds the thinner pot of money provide by the General Assembly that the State Board of Education reduced individual payouts this year by as much as $447." The Houston Independent School District mistakenly allocated about $73,700 to 99 employees (see, for example, Radcliffe, 2007).
[19] Lazear, E. (1997). *Modern Personnel Economics for Managers*. New York: Wiley. Lavy (2002) and Lavy (2007) reports findings from two rank-order tournaments in Israel.
[20] Many chapters in this volume address complexities associated with designing, implementing, and managing a performance incentive system. See, for example, McCaffrey, Han, and Lockwood (2008), Rothstein (2008), and Neal (2008). The Center for Educator Compensation Reform also posts useful information on implementing teacher compensation reforms on their website (www.cecr.ed.gov/guides/compReform.cfm).
[21] We could not reliably calculate a plan maximum award for 5 of the 85 schools that provided data on their award distributions.
[22] This information comes from the authors own calculations using the Schools and Staffing Survey (SASS), conducted by the United States Department of Education's National Center for Education Statistics. SASS is a nationally representative sample of roughly 8,000 public schools and 43,000 public-school teachers. There have been five waves of SASS, associated with five school years: 1987-1988, 1990-1991, 1994-1995, 1999-2000, and 2003-2004. A sixth administration is currently in the field (2007-2008). For more information about trends in teacher pay using the SASS, see Podgursky, M. (2008). Teacher Compensation Reform: A Market-Based Perspective. In M.G.

Springer (Ed.), Performance Incentives: Their Growing Impact on American K-12 Education. Washington: Brookings Institution Press; Podgursky, M., Springer, M., Ghosh-Dastidar, B., and West, M.R. (2008). The diffusion of teacher pay policies: Evidence from multiple waves of the Schools and Staffing Survey. National Center on Performance Incentives Working Paper #2008-25. Nashville, TN. An insightful comparison of personnel policy, wage setting, and teacher quality in traditional public, public charter, and private schools can be found in Podgursky, M. (2007). Teams versus Bureaucracies. In M. Berends, M.G. Springer, and H.J. Walberg (Eds.). Charter School Outcomes. New York: Taylor and Francis Group.

[23] Teachers who did not receive an award were coded as receiving an award of zero dollars. Because there may be a correlation in the residuals between two schools from the same school district, we report robust standard errors clustered by school district for the OLS and Probit models. The Tobit methodology does not accommodate clustered standard errors, so the standard errors for the Tobit model have not been clustered.

[24] When examining the actual distribution of GEEG awards we also found that nearly one-third of GEEG schools awarded Part 1 funds to teachers who had taught at the school during 2004-05 school year, but were no longer working at the school. Some GEEG schools may have retroactively rewarded these teachers since a school's performance during the 2004-05 school year was used to determine which schools were selected to be part of the GEEG program.

[25] We consider bilingual education/ESL teachers to be part of the state's testing system because the No Child Left Behind Act of 2001 requires schools to report separately on the adequate yearly progress of students with limited English proficiency.

[26] Amemiya, T. (1973). "Regression analysis when the dependent variable is truncated normal. *Econometrica* **41** (6), 997-1016; Tobin, J. (1958). "Estimation for the relationships with limited dependent variables." *Econometrica* **26** (1), 24-36.

[27] The hypothesis that the coefficients on the three experience variables are jointly equal to zero cannot be rejected at the 10-percent level.

[28] The hypothesis that the coefficients on the three educational attainment variables are jointly equal to zero cannot be rejected at the 10-percent level.

[29] Goldhaber, DeArmond, and Player (2007); Jacob and Springer (2007).

[30] Encinosa, Gaynor and Rebitzer (2007) find that small groups are more likely to adopt equal sharing rules than are large groups, but that when mutual assistance is important, large groups must offer weaker incentives to achieve the same level of mutual aid.

[31] See Freeman and Gelber (2006).

[32] The share of male teachers ranges from a minimum of zero to a maximum of 63 percent, with a sample mean of 26 percent.

[33] For other work on gender preferences in incentive pay plans, see Ballou and Podgursky (1993), Goldhaber, DeArmond, and Player (2007), or Eckel and Grossman (2002).

[34] Ballou and Podgursky (1993) or Goldhaber, DeArmond, and Player (2007).

[35] Ballou and Podgursky (1993), Goldhaber, DeArmond, and Player (2007), or Jacob and Springer (2007).

[36] The predicted probabilities are 48.2 percent and 13.9 percent, respectively. The predicted probabilities are calculated using the method of recycled predictions, holding all other variables in the model constant at their means.

[37] Eight schools are excluded because of incomplete data.

[38] The marginal effect of school size is a nonlinear function of enrollment. For the Plan Gini and Actual Gini analyses, the marginal effect is positive for all school sizes, and statistically significant (at

the 10 percent level) for all but a handful of schools. For the share of teachers with no award, the marginal effect is significant and positive for some schools, and insignificant for the rest.

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