

Final Evaluation Report
Tennessee's Strategic Compensation Programs
Findings on Implementation and Impact
2010-2016

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Executive Summary

This report is the fourth and final in a series of annual evaluation reports for three federally-funded strategic compensation initiatives in Tennessee. It includes new analyses from data collected during and after the fourth implementation year (2014-15) of Tennessee’s TIF, CSF, and IAF strategic compensation programs as well as summative information about the entire grant period.

As in previous reports, we discuss the following dimensions of strategic compensation: (1) the amount and distribution of awards; (2) educators’ perceptions and attitudes; (3) the effect on teacher retention and turnover; and (4) the effect on student achievement. This report differs from previous reports in that considerably more detail is provided about the criteria used to determine awards (e.g., student test scores, teacher and administrator evaluation scores) and the unit of accountability (whether awards were based on the performance of individual teachers or on the performance of grade-level/subject-area teams or the school/district as a whole). The distribution of bonuses is described with respect to these parameters. We also investigate whether the design of strategic compensation plans has affected teacher attitudes, teacher retention, and student achievement.

Our principal findings follow.

Amount and Distribution of Awards

- The thirteen participating districts¹ distributed \$6.7 million in payouts in 2014-15 and a total of nearly \$29 million since 2011-12.
- The average payout amount in 2014-15 was roughly \$1,500. Payouts ranged from \$13 to \$10,000.
- Trousdale County led all districts in average award amounts in 2014-15 with average awards of \$3,050. Average payouts in Lexington County were \$850, the lowest average payout in 2014-15.

¹ There were fourteen districts that received TIF, CSF, or IAF grants. One of them, South Carroll, declined to respond to our request for information on bonuses paid out. All analyses involving payouts are therefore based on the thirteen other districts.

² All references to TN TIF throughout this report refer to the grant awarded to Tennessee as part of the 2010 TIF

- Since 2011-12, nearly 70 percent of all payouts have been on the basis of either summative teacher evaluation measures or student test growth-specific measures. In that same time span, 75 percent of payouts have been distributed using individual-level measures of performance.
- Individual awards in the \$1,000-\$2,000 range accounted for 61 percent of total payouts in 2014-15. Awards larger than \$5,000 accounted for roughly 3 percent of payouts.
- Nearly six out of ten participating teachers and administrators received a payout in 2014-15.

Perceptions and Attitudes: Tennessee Educators' Views of Strategic Compensation

- Overall, the results from the two SC surveys administered in spring 2015 and 2016 are fairly consistent with results from earlier administrations. Generally, school leaders held the most favorable views of SC and its effects. Teachers held the most critical views.
- Beliefs about SC programs and their effects were the least favorable in the first year of implementation (2011-12), improved substantially in the second year of operation, then became slightly more critical in each of the next two years before rebounding slightly in 2016.
- Although only half of teachers expressed favorable perceptions and attitudes regarding the SC programs in their schools, about two of every three indicated they wanted the bonus and/or alternative salary programs in their schools to continue.
- The most important variable associated with teachers' perceptions and attitudes is whether or not they received performance based pay from the SC program in their school, and for those who did receive performance-based pay, whether the amount they received was equal to or more than they expected to receive. This is true even after controlling for teacher characteristics (e.g., experience) and the types of schools in which they worked.
- Shifting views of SC over time parallel changing attitudes toward teacher evaluations. Teachers who indicated that they perceived their evaluations to be fair were more favorably disposed toward the SC programs in their schools. This is unsurprising, given that nearly all the SC plans in districts participating in the SC initiative included results

from educator evaluations as an important criterion for determining bonuses and/or alternative salary increments.

- SC plans differed considerably with respect to the type of performance measures and the weight given to each in determining an award. However, how awards are determined was not a strong predictor of perceptions and attitudes.
- Teachers are most likely to take a favorable view of plans that offer many of them an opportunity to earn an award. The finding that favorable attitudes were less likely among teachers whose expectations were not met suggests that simple, transparent plans are desirable.

Effect of Strategic Compensation on Teacher Retention and Turnover

- There is no evidence that the strategic compensation program increased teacher retention in bonus-only schools. Instead, the evidence suggests that retention rates in bonus-only schools fell significantly after each round of the strategic compensation program.
- Retention rates fell more than expected because the probability of leaving the public school system increased for bonus-only schools after all three years. The probability of moving to another Tennessee district also increased, but the change was only statistically significant after the second year.
- There is some evidence that the increase in turnover among bonus-only schools was concentrated among teachers with relatively low TVAAS scores.
- In contrast, overall teacher retention increased after years 2 and 3 for alternative salary schedule schools (although the difference after year 3 is imprecisely measured and not statistically significant).
- TVAAS scores were negatively related to turnover throughout this period. This negative relationship weakened in 2014-15 statewide, though not in schools with strategic compensation plans.
- All other things being equal, teachers who did not receive a payout had an elevated probability of turnover, while the probability of turnover among teachers who received a substantial award was very small.

Effect of Strategic Compensation on Student Achievement

- Consistent with the second- and third-year reports, strategic compensation overall had no discernible impact on achievement in mathematics and reading/language arts.
- Compensation plans that put greater weight on test-based performance measures were no more likely than other plans to raise student achievement. However, these effects are imprecisely estimated. We cannot rule out the possibility that there were positive, albeit modest, effects on achievement.
- Awards to teams of teachers (including school- and district-wide bonuses) appear to have had a greater effect on achievement than awards to individuals. However, this finding was only marginally significant and held only for mathematics. The mechanism underlying this effect is unclear: there was no relationship between type of award (whether to teams or to individuals) and the extent to which teachers collaborated with colleagues.

Introduction

This report is the fourth and final in a series of annual evaluation reports for three federally-funded strategic compensation initiatives in Tennessee. In 2010, the Tennessee Department of Education (TDOE) received over \$500 million through a combination of Race to the Top (RTTT) and Teacher Incentive Fund (TIF) grant funds designated for reforming educator compensation as part of a larger effort to develop and retain great teachers and school leaders. Tennessee's RTTT proposal included two initiatives, the Competitive Supplemental Fund (CSF) and the Innovation Acceleration Fund (IAF), which supported Local Education Agencies (LEAs) as they planned, designed, and implemented strategic compensation programs. These two initiatives, combined with a \$36 million TIF grant (TN TIF²), involved 14 LEAs and almost 200 Tennessee schools over the duration of the 5 year grant.

Overview of Race to the Top and the Teacher Incentive Fund

The American Recovery and Reinvestment Act of 2009 included \$4.35 billion for RTTT, a competitive grant program for states with innovative plans for improving education. RTTT has four key areas of reform:

- Adopting standards and assessments that prepare students to succeed in college and the workplace and to compete in the global economy;
- Building better data systems that measure student growth and success, and inform teachers and principals about how they can improve instruction;
- Recruiting, developing, rewarding, and retaining effective teachers and principals, especially where they are needed most; and
- Turning around the lowest-achieving schools (ED, 2009)³.

² All references to TN TIF throughout this report refer to the grant awarded to Tennessee as part of the 2010 TIF cohort, which was the third round of TIF grants awarded by the U.S. Department of Education. Tennessee was also the recipient of a 2012 TIF grant (round 4) which includes three other districts and is not part of this evaluation report.

³ For more information about the RTTT Fund, please visit <http://www2.ed.gov/programs/racetothetop/index.html>

TIF, first proposed under the George W. Bush administration, is a competitive five-year grant that began in 2006 with 16 grantees in 12 states (cohort 1). In total, there have been four cohorts, which include over 100 grantees in more than 30 states. TIF is primarily focused on the development and management of strategic compensation programs, especially in high-need schools. The grant's stated goals are to:

- Improve student achievement by increasing teacher and principal effectiveness;
- Reform teacher and principal compensation so that teachers and principals are rewarded for increases in student achievement;
- Increase the number of effective teachers teaching poor, minority, and disadvantaged students in hard-to-staff subjects; and
- Create sustainable performance-based compensation systems (ED, 2015).

Over time, federal TIF guidelines have placed greater emphasis on the need for systemic reform at grantee sites by making district-wide human capital management systems informed by educator evaluation outcomes absolute priorities in the most recent grant competition.⁴

Overview of Tennessee's Strategic Compensation Initiatives

While CSF, IAF, and TN TIF all focus district efforts on performance pay for educators, each grant also has distinct features. A description of each grant follows.

CSF

CSF committed \$1.5 million over a four-year period (2010-2014) from RTTT funds. CSF grants were awarded annually and targeted the 20 percent of districts that received the smallest share of other RTTT LEA funds. The competitive awards process focused on three priorities: (1) developing job-embedded professional development plans linked to educator evaluation; (2) developing strategic compensation models for teachers and principals in order to increase educator effectiveness and student achievement; and (3) using innovative strategies or interventions to turn around low-performing schools and increase student academic proficiency

⁴ For more information about TIF, please visit <http://www2.ed.gov/programs/teacherincentive/index.html>. A national evaluation of the first two TIF cohorts is complete. The first implementation report is available at <http://www2.ed.gov/rschstat/eval/teaching/tif/report.pdf>. The final evaluation report is available at <http://www2.ed.gov/rschstat/eval/teaching/tif/tif-final-report-062016.pdf>

(TDOE, n.d.). In 2010, five LEAs earned a one-time award of \$50,000 each to develop a strategic compensation program. With one exception, each CSF grantee also received additional funding through either IAF or TN TIF (or both) at the beginning of the 2011-12 school year to implement its compensation model.⁵

IAF

IAF committed \$3 million per year over a four-year period (2010-2014) to support the development of strategic compensation programs that included alternative salary schedules.⁶

TDOE provided grantees with a set of five broad parameters to guide the design of their programs. IAF compensation programs must include (IAF Application, 2010):

- An alternative salary schedule that sets pay for educators on factors other than level of education or years of experience.⁷
- Differentiated performance-based pay for effective teachers with awards ranging from \$1,500 to \$10,000 based on individual and/or group (i.e., school or team) performance.⁸
- Financial working condition, recruitment, and retention incentives to hire and retain teachers in hard-to-staff subjects and schools.
- The use of data and evaluations to inform decisions related to professional development, retention, and tenure.
- A sustainability plan evidenced by an increasing reliance on non-IAF dollars by the second year of implementation (2012-13).

Four LEAs received IAF funds at the end of 2010 and began implementation in the 2011-12 school year.⁹ Federal funding ended during the 2013-14 school year.

TN TIF

Tennessee received a five-year, \$36 million federal TIF grant in the fall of 2010 as part of the third cohort of TIF grantees. TN TIF included 12 LEAs¹⁰ that developed performance-based bonus compensation models during the 2010-11 school year and implemented bonus models

⁵ The five CSF LEAs were Bradford Special School District, Hollow Rock-Bruceton Special School District, Lexington City Schools, South Carroll Special School District, and Trousdale County Schools. South Carroll did not receive implementation funding through IAF or TN TIF but received additional funding from a later round of CSF to implement their strategic compensation model.

⁶ Compensation models could additionally include performance-based bonuses.

⁷ As required by law, the Commissioner of Education and State Board of Education has to approve an alternative salary schedule before a public school district implements one.

⁸ Guidelines stipulated that awards could not be based on school performance alone.

⁹ The four IAF districts are Knox County Schools, Lexington City Schools, Putnam County Schools, and Trousdale County Schools.

¹⁰ Districts receiving TIF grants were Bradford SSD, Hamilton County, Johnson County, Knox County, Lebanon SSD, Lexington City Schools, McMinn County Schools, Metropolitan Nashville Public Schools, Putnam County Schools, Shelby County Schools, and Tipton County Schools.

during the 2011-12 school year. TIF funding continued through the 2014-15 school year with the final round of payouts occurring in the fall of 2015.

Figure I – Timeline for CSF, IAF, and TN TIF, 2010 Cohort

	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
IAF	Fall: Cohort Grants Awarded	Year 1 Implementation	Year 2 Implementation	Year 3 Implementation (final year)	3rd/Final IAF payouts (for 2013-14 performance)	
	Spring/Summer: Planning, Development, and Approval		Fall: 1st Payouts (for 2011-12 performance)	Fall: 2nd payouts (for 2012-13 performance)		
CSF	Cohort awarded \$375,000 in one-time planning grants to be spent by 2014					
TN TIF	Fall: Cohort Grants Awarded	Year 1 Implementation	Year 2 Implementation	Year 3 Implementation	Year 4 Implementation (final year)	Final TIF payouts (for 2014-15 performance)
	Spring/Summer: Planning, Development, and Approval		Fall: 1st Payouts (for 2011-12 performance)	Fall: 2nd payouts (for 2012-13 performance)	Fall: 3rd payouts (for 2013-14 performance)	

Evaluation of CSF, IAF, and TN TIF Initiatives

Both RTTT and TIF grants include a commitment to having state initiatives independently evaluated. The Tennessee Consortium on Research, Evaluation, and Development (the Consortium) is responsible for carrying out a program evaluation of the strategic compensation programs being implemented as part of the CSF, IAF, and TN TIF initiatives. As much as possible, evaluators have examined these strategic compensation initiatives concurrently since they share similar expectations for implementation and outcome and also because half of participating districts received funding from at least two of the initiatives.¹¹

¹¹ Trousdale County remained part of the evaluation during the 2014-15 and 2015-16 school years due to the fact that they continued to fund their strategic compensation program with district money after the conclusion of CSF and IAF funding. South Carroll SSD was excluded from the evaluation after the 2013-14 school year as they did not continue to use their strategic compensation program after the conclusion of the CSF grant.

The research questions guiding the Consortium's work are listed below:

1. What was the process for planning and developing the new compensation programs?
2. What were the key design features of the new compensation models?
3. What were stakeholder perceptions about compensation program design, development and implementation processes, and program impact in their schools?
4. How did the new compensation programs influence educator professional practices?
5. What was the actual financial impact of the new compensation programs on educator compensation?
6. What was the impact of the new compensation programs on educator turnover and retention?
7. What was the impact of the new compensation programs on student achievement/gains?
8. How did program design influence the ways in which the new compensation programs ultimately impacted teaching and learning in schools?

Overview of Methods

As stated previously, this report is the fourth and final evaluation report. It includes new analyses from data collected during and after the fourth implementation year (2014-15) of Tennessee's TIF, CSF, and IAF strategic compensation programs as well as summative information about the entire grant period. It is informed by six primary sources:

1. **Reviews of strategic compensation models and implementation plans**
Researchers collected and reviewed information about each LEA's strategic compensation plan in the fall of each year. Documentation submitted by districts provided information about model design features, eligibility groups, and award sizes. Researchers compared current program designs to models from previous years, tracked revisions over time, and categorized and coded specific plan features.
2. **Interviews with district officials**
In the spring/summer of each grant year, researchers conducted phone interviews with individual(s) who had primary responsibility for overseeing an LEA's strategic compensation program. Interviews focused on implementation experiences, logistics, successes and challenges, impact, and future plans.
3. **Survey of school personnel**
The annual online compensation surveys were conducted during each grant year, and a final survey was administered in the winter of 2015-16 after final payouts were

complete in most districts. All certified teachers in participating schools received an email invitation to participate in the survey. The survey included sections on perceptions of awards, implementation, impact, payouts, and general attitudes about compensation reform. Individuals participated voluntarily, and their responses remain confidential.

4. Individual payout data

Researchers gathered individual-level payout data from each participating LEA for each round of payouts. Districts provided total award amounts as well as a breakdown of awards by performance measure. Data was analyzed to determine the distribution of actual payouts and then merged with Personnel Information Reporting System (PIRS) and Education Information System (EIS) data to determine the characteristics of payout recipients.

5. Administrative records from PIRS and EIS

Researchers additionally used PIRS and EIS data to examine whether strategic compensation programs affected teacher retention and mobility in participating schools and whether there was any change in the relationship between teacher turnover and teacher characteristics.

6. Student performance data

In each year, researchers used longitudinal student achievement data for reading and math in grades 3 through 8 to evaluate whether proficiency levels and/or growth scores in participating schools differed from other schools as well as whether different plan design features (i.e., plans with only a bonus component vs. plans with both an alternative salary and a bonus component) influenced student achievement results.

Table I shows the schedule of evaluation activities to date.

Table I - Timeline for Evaluation Activities

Evaluation Task	2010-11 Planning Year			2011-12 Implementation Y1			2012-13 Implementation Y2			2013-14 Implementation Y3			2014-15 Implementation Y4			2015-16 Post-Implementation Year		
	F	SP	S	F	SP	S	F	SP	S	F	SP	S	F	SP	S	F	SP	S
Application Review			x															
District Plan Review			x			x			x			x			x			
District Interviews					x			x			x			x				
Payout Analysis								x (Y1)			x (Y2)			x (Y3)				x (Y4)
Surveys				x				x			x			x				x
Teacher Turnover Analysis								x			x			x				x
Achievement Analysis								x (Y1)			x (Y2)			x (Y3)				x (Y4)

This report follows the first three program evaluation reports, Year 1 (2011-12) and Year 2 (2012-13), and Year 3 (2013-14). It adds to our understanding of strategic compensation in several ways. It updates previous reports with information on program implementation and operation in 2014-15. It includes findings from surveys of educators conducted in the spring of 2015 and the spring of 2016. Analyses of the effect of strategic compensation on teacher turnover and on student achievement have been conducted using data from 2014-15 as well as earlier years. Finally, a newly developed scheme for categorizing and coding features of each school’s strategic compensation plan has made it possible to investigate the effect of program design on teachers’ attitudes toward strategic compensation, their career choices, and the achievement of their students.

The first evaluation report focused on the first four research questions (above) with information about the process for developing compensation programs, the design of compensation models, and educator and district leader perceptions of the program after the planning and first implementation year. The scope of the second and third evaluation reports was wider, addressing research questions two through eight, updating information about model design and educator perceptions/practices, and adding analyses of award payouts, teacher turnover and mobility, and student achievement during the second implementation year.

Previous evaluation findings reveal that LEAs developed a variety of compensation models with involvement from multiple stakeholders at the local level. The programs focused on rewarding educators for their contributions to student learning and for professional development. Eligibility extended to all teachers and administrators in most cases. Educator perceptions of the programs improved over the first three years of the program but remained mixed. Educators consistently reported a good understanding of bonus awards but expressed mixed views of the motivational influences of performance-based compensation and its impacts on teaching and learning. District officials expressed growing confidence and satisfaction with program management especially after the second and third implementation years, and several noted improvements in district communication, instruction, professional development, and data usage.

Findings from the second evaluation year (the first round of analyses on award payouts, mobility, and student achievement) reveal that payouts were generally small and paid mostly to classroom teachers. Larger awards generally went to more experienced teachers, especially those with Tennessee Value Added Assessment (TVAAS) scores.¹² Initial turnover and achievement analyses do not suggest that strategic compensation programs reduced teacher turnover or had an impact on student performance. However, researchers stressed that findings were preliminary (based on only one year of program implementation) and that further research would be necessary in order to draw conclusions about the impact of Tennessee's strategic compensation programs on these indicators.

Findings from the third evaluation year (the second round of analyses on award payouts, mobility, and student achievement) were similar to those in the second year. In the second round of payouts, payouts were again small, even smaller than in round 1 and paid mostly to classroom teachers. Turnover analyses suggest that retention rates fell in the third year in bonus-only districts while there is some evidence in alternative salary districts that retention of beginning teachers and teachers with TVAAS scores increased. All other things being equal, teachers who did not receive a payout were more likely to turn over than those who received a substantial award. Findings from analyses of student achievement during the third year remain inconclusive. These outcomes will continue to be addressed in this evaluation report.

In the remaining pages of this report, findings from the fourth program year (2014-15) and the post-implementation year (2015-16) are organized in chapters that address specific topics. The findings are preceded by an overview of the current landscape of compensation reform in

¹² TVAAS is a statistical analysis tool that shows academic growth over time. It provides effectiveness scores for schools and individual teachers. More information about TVAAS can be found at <https://tvaas.sas.com/welcome.html?as=b&aj=b>

public education. Program evaluation findings follow, beginning with Chapter 2, which summarizes the characteristics of participating districts. The distribution of the second round of payouts is discussed in Chapter 3. Educator experiences with and perceptions of the development, implementation, and outcomes of the strategic compensation programs are presented in Chapter 4. The impact of strategic compensation on teacher turnover and student achievement can be found in Chapters 5 and 6, respectively. The final chapter provides a summary of lessons learned and conclusions incorporating findings from all years of grant implementation.

Chapter 1: Review of Relevant Literature

Many districts and states have initiated performance pay policies to identify, reward and retain teachers that lead students to significant gains in achievement (Podgursky and Springer, 2007; Goldhaber, 2009; Springer, 2007; Johnson and Papay, 2009; Podgursky and Springer, 2011). These policies are motivated in large part by research indicating that the most important determinants of a teacher's pay, years of experience and advanced degrees, are not closely related to student performance or school outcomes (Gordan, Kane, and Staiger, 2006; Rivkin, Hanushek, and Kain, 2005; Rockoff, 2004; Goldhaber, 2002). Many stakeholders have focused on pay for performance programs as a means to correct inefficiencies found in traditional salary schedules. However, how they influence student test scores and the composition of the teacher workforce is still not fully understood in practice.

The purpose of this section is to provide an overview of recent evaluations of educator incentive pay programs. We first focus on TIF-funded efforts, which have dramatically increased the number of public school systems implementing various compensation reform models. Since 2006, for example, TIF has funded 131 projects to reform pay structures and reward effective teachers and principals in high poverty schools. Over \$2.4 billion dollars has been appropriated to support these projects, affecting more than 2,000 schools across approximately 300 urban, suburban, and rural school districts in 36 states and Washington, D.C. We then turn attention to evaluations of other compensation reforms in the United States, discussing their impact on student test scores and then the composition of the teacher labor market.¹³

Evaluations of TIF-funded Compensation Reform

- A subset of 2010 TIF grantees participated in a random assignment study led by Mathematica Policy Research. The intervention examined was the pay for performance component of TIF, as both treatment and control schools implemented all other

¹³ Some of the most rigorous scientific evidence on teacher compensation reform comes from abroad. Although most report generally positive effects on student achievement (e.g., Muralidharan and Sundararaman, 2011; Glewwe, Ilias, and Kremer, 2010; Lavy, 2002, Lavy, 2009; Santibanez, 2007), it is less clear whether these programs actually promoted long-run learning. Some studies find the incentive pay effects do not persist over time or document opportunistic behaviors on the part of treatment teachers that account for increased student achievement (Glewwe, Ilias, and Kremer, 2010). Furthermore, these findings are not necessarily generalizable to the U.S. context. The incentive structure facing teachers and schools (e.g., Andhra Pradesh, India or rural Kenya) are very different from the operational context found within the U.S. public school system.

required components, including professional growth opportunities. A total of 132 schools participated – 66 treatment schools and 66 control schools. Two years after the implementation of these programs, the researchers found that the pay for performance component of TIF had small, positive impacts on students' reading achievement, while impacts on mathematics achievement were not statistically different from control schools. They also reported that pay for performance did not enable schools to retain or attract more higher-performing teachers (Chiang, et al., 2015). Findings after three years of implementation are expected in Fall 2016.

- The Ohio Department of Education received a TIF grant as part of the first cohort in 2006. Westat concluded a five-year program evaluation in 2011 (MacAllum, Wells, & Ristow, 2011). Using a mixed-method approach, the authors examined implementation, impact, and sustainability. While they found some positive effects on instructional practices, collaboration, and school climate, they determined that there was little to no impact on student achievement as measured by the Ohio Achievement Tests in reading and math.
- The System for Teacher and Student Advancement (formerly known as the Teacher Advancement Program or TAP), under the aegis of the National Institute for Excellence in Teaching, has been in operation since its launch in 1999 by the Milken Family Foundation. It is organized around four components: multiple career paths, ongoing applied professional growth, instructionally focused accountability, and performance-based compensation. Mathematica Policy Research conducted a five-year impact evaluation of TAP in Chicago Public Schools, which was the first random assignment study of TAP (Glazerman and Seifullah, 2012). The research team reported changes in areas associated with mentoring and teacher leadership in TAP schools as compared to non-TAP but found no overall impact on student achievement. They also report mixed evidence of increased teacher retention, but this varied over time and across categorization of teachers.
- The TIF-Leadership for Educators' Advanced Performance (TIF-LEAP) began in Charlotte-Mecklenburg Schools (North Carolina) in 2007. The five-year initiative used two different measures of teacher effectiveness: student learning objectives and a value-added measure. Program evaluators reported that TIF-LEAP improved student achievement as measured by North Carolina End-of-Grade tests (Slotnik & Smith, 2013).
- Dallas ISD received a \$22 million federal TIF grant (cohort 1) and an \$11 million state District Awards for Teacher Excellence (DATE) grant in 2006. Dallas ISD created a

compensation model that included three components: an achievement incentive award which included an individual and a school-level measure, a targeted impact school incentive award which provided incentives to teachers who taught in high-needs schools, and a principal incentive award paid to principals whose schools met prescribed student achievement levels (e.g., accountability rating, proficiency levels, etc.). In the final evaluation report, researchers provided evidence of positive impacts on teacher recruitment and retention as well student achievement but cautioned that their findings could not prove a causal relationship between the compensation program and improved student achievement because of the potential influence of other factors (Kim and Kihneman, 2011).

- Mission Possible is a pay for performance program first implemented by Guilford County Public Schools (NC) during the 2006-07 school year. The Mission Possible program provides recruitment and performance-based incentives for educators, ranging in size from \$2,500 to \$10,000. Using a matched comparison study design, Bayonas (2010) did not find any significant achievement differences between treatment and comparison schools after three years of implementation.
- The Financial Incentive Rewards for Supervisors and Teachers (FIRST) program was implemented in the Prince George's County Public School System. It was designed during the 2007-08 school year and first implemented in 2008-09. FIRST provides educators bonuses based on student performance, professional growth and contribution, classroom observations, and working in a hard-to-staff subject. A mixed-methods study of the program reported that teachers' perception of pay for performance varied based on the size of their individual bonus award and the degree to which their payouts were commensurate with the effort invested in the program. Additionally, future participation in the program depended on the size of the award received and whether teachers perceived the program to be fair (Rice, Malen, Jackson, and Hoyer, 2015).
- A recent study examines the opportunity costs associated with participation in the TIF program. Performing a resource-cost analysis of TIF implementation in three grantee sites, Hoyer (2015) finds that opportunity costs associated with implementing educator compensation reforms amounted to over \$1 million in operating costs on average and as much as \$6 million per year in the costliest district.

Evaluations of Other Compensation Reforms

There are a growing number of rigorous evaluations of performance pay programs in U.S., with evidence generally showing negligible effects on student performance.

- The Schoolwide Performance Bonus Program (SPBP) provided financial rewards to educators in high need schools in New York City based on overall school performance. In the 2007-08 school year, 427 high need schools were identified. About half were randomly assigned to participate in the program. A two-year evaluation focused on implementation and outcomes, especially related to student performance, revealed that the program did not have a positive effect on student performance (Marsh et al., 2011; Fryer, 2011; Goodman and Turner, 2010). Nor did the researchers find an impact on teachers' reported attitudes, perception, and behaviors.
- The Project on Incentives in Teaching (POINT) experiment was a three year study conducted in Metropolitan Nashville School System during the 2006-07 through 2008-09 school year, in which middle school mathematics teachers voluntarily participated in a controlled experiment to assess the effect of financial rewards for teachers whose students showed unusually large gains on standardized tests. While the general trend in middle school mathematics performance was upward over the period of the project, the students of teachers randomly assignment to the treatment group did not outperform students whose teachers were assigned to the control group (Springer et al., 2013).
- The Pilot Project on Team Incentives experiment was a two year study conducted in Round Rock, Texas, starting in the 2008-09 school year, in which interdisciplinary teams of middle school teachers voluntarily participated in a controlled experiment to examine the impact of team-level pay for performance. A total of 81 teams of teachers were randomly assigned to treatment and control conditions. The research team found no significant effects on the achievement of students or the attitudes and practices of teachers (Springer et al., 2012).
- ProComp is a comprehensive educator compensation system first implemented in Denver, Colorado, during the 1999-2000 school year. ProComp teachers have the opportunity to earn bonuses by meeting requirements in four domains: Comprehensive Professional Evaluation; Knowledge and Skills; Market Incentives; and Student Growth. Goldhaber and Walch (2012) find that student achievement increased during the years ProComp was implemented, but that the gains were observed for students taught by teachers not participating in the ProComp program as well as students of participants.

They also report suggestive evidence that teachers opting into the ProComp program are somewhat more effective than those teachers that opted not to participate.

- The Teacher Advancement Program is a comprehensive educator compensation reform model organized around four components: multiple career paths, ongoing applied professional growth, instructionally focused accountability, and performance-based compensation. An independent evaluation of TAP compared schools that chose to implement TAP and those that did not in two unidentified states. The research team found that the program has positive effects on mathematics achievement in elementary grades but negative effects for student in select middle and high school grades (Springer, Ballou, and Peng, 2015).
- REACH is a comprehensive educator compensation system first implemented in Austin, Texas, during the 2004-05 school year. The REACH program is associated with positive student test scores gains in both math and reading during the initial year of implementation. Student test scores gains were maintained the second year, but the research team did not find any additional growth. They also found that teacher-designed student learning objectives were not significantly correlated with a teacher's value-added scores. Indeed, evidence suggested that less effective teachers were more likely to meet their student learning objectives.
- During the 2011-12 school year, nine schools in Chicago Heights, IL, participated in a teacher incentive pay experiment that tested two forms of incentive pay, one of which paid teachers in advance and required them to give back money if their students did not meet predetermined performance thresholds. The researchers found that framing a teacher incentive program in terms of losses rather than gains led to significant improvements in student outcomes (Fryer et al., 2012).
- The ASPIRE program was implemented in Houston Independent School District during the 2006-07 school year. ASPIRE is a rank-ordered tournament incentive pay program that pays teachers based on the relative value-added of their students' performance on math, English, science, and social studies standardized assessments to include a group-based performance measure. It also includes a group-based component that rewards teachers for all students in a particular grade, subject, and school. Imberman and Lovenheim (2013) estimated the impact of incentive strength on student achievement under the group-based incentive pay component of ASPIRE. Using the share of students instructed by a teacher as a proxy for incentive strength, they found an improvement in student achievement when a teacher becomes responsible for more students.

A growing body of literature documents the impact of compensation reform on teacher recruitment and retention.

- IMPACT is a high-stake teacher evaluation system implemented in Washington DC, in which teachers were eligible for one-time bonuses up to \$25,000 if rated highly effective and a sizeable and permanent base salary increase as large as \$27,000 per year if rated highly effective for two consecutive years. Using a regression discontinuity design, the research team compared teachers near the IMPACT score threshold that separated “Effective” from “Highly Effective” teachers. The IMPACT incentive had positive effects on teacher performance, while impacts on retention of effective teachers were not statistically significant.
- In the spring of 2013, in an effort to combat high rates of teacher turnover among highly effective teachers in chronically low-performing schools, the Tennessee Department of Education and the Tennessee Governor’s Office announced a 1-year teacher retention bonus program for Priority Schools. Under the program, all Priority Schools were eligible to offer \$5,000 retention bonuses to any highly effective teacher who returned to a Priority School the following school year. Using a fuzzy regression-discontinuity design, the research team found that the program had significant, positive impact on teachers of tested subjects and grades.
- The Talent Transfer Initiative (TTI) was a large-scale randomized experiment designed to test transfer incentives for high-performing teachers. TTI offered high value-added teachers a \$20,000 bonus – paid in installments over a 2-year period – if the teacher transferred to and remained in a school that had low average test scores. The transfer incentive increased both transfer and retention of targeted teachers during the payout period across 10 school districts in seven states. However, not surprisingly, the increase was no longer statistically significant after payments stopped.
- California’s Governor’s Teaching Fellowship program was a program that offered \$20,000 conditional scholarships (\$5,000 per year over 4 years) to attract and retain academically talented, newly licensed teachers to low-performing schools. The program had significant effect on teacher recruitment but did not differentially affect retention among Fellowship recipients (Steele et al., 2009).
- For a three-year time period beginning in 2001, North Carolina awarded an annual bonus of \$1,800 to certified math, science and special education teachers working in a

set of low-performing and/or high-poverty secondary schools. The authors found modest but significant effects on teacher turnover. Indeed, they reported that bonuses reduced turnover rates of eligible teachers in eligible schools by 17 percent, or 5 percentage points (Clotfelter et al., 2008).

- The Governor Educator Excellence Grant program in Texas was a pilot program that identified the 100 highest-poverty, high-performing schools in the state and awarded them noncompetitive grants to design and implement performance pay. In their evaluation of the program, Springer and Taylor (2016) explore incentive design not only from the perspective of the employer—by examining changes in teacher productivity and retention—but also from the perspective of the employee, by examining the preferences revealed by the incentives teachers design for themselves. They found that when given the opportunity, teachers design relatively weak, group-oriented incentive pay plans. In turn, those relatively weak incentives do not appear to be associated with any significant changes in teacher productivity, although they are correlated with teacher turnover, which, in the long run, could theoretically improve student outcomes.

The research on these programs illustrates the difficulty of evaluating a wide range of different compensation programs. The dearth of consistently positive results is likely due to a combination of factors: inconsistent implementation, varying designs that make comparison difficult, ineffective model components (such as awards that are too small), and lack of teacher capacity to make instructional improvements despite being motivated to do so (Lincove, 2012; Marsh et. al., 2011; Fryer, 2011; MacAllum et al., 2011). Whatever the explanation, as compensation reform initiatives continue, so will efforts to identify best practices in implementation and model design.

Chapter 2 – Participating District Characteristics

This section provides a summary of the LEAs in Tennessee’s 2010 TIF, CSF, and IAF grant cohort and places participating districts and schools within the broader Tennessee public school environment.

District Characteristics

There is great variability among participating LEAs. Four of the state’s five largest districts are included as well as three of the smallest. They serve from 400 students to almost 150,000 students in one to over 277 schools. They employ as few as 38 certified employees up to over 9,000. According to the NCES classifications, six are rural (fringe or distant), four are town (distant or remote), two are large suburban, and two are city (large and midsize).

Characteristics of participating LEAs and schools are described based on data from the 14-15 school year. Table 2.1 provides details about each LEA including the number of schools, student enrollment, and pertinent student demographics.

Table 2.1 – Summary of District Characteristics, CSF, IAF, and TN TIF, 2010 Cohort

		Schools		Enrollment		% Minority		% Economically Disadvantaged		Employees*	
District	Locale	District Total	Program % (No.)	District Total	Program Schools Only % (No.)	District	Program Schools	District	Program Schools	Teachers	School Administrators
Bradford	Rural:Distant	2	100% (2)	541	100% (541)	6%	6%	63%	63%	42	2
Hamilton	Suburb: Large	79	16% (13)	43,540	15% (6373)	44%	22%	61%	70%	3,046	157
Hollow Rock-Bruceton	Rural:Distant	2	100% (2)	651	100% (651)	17%	17%	76%	76%	46	3
Johnson	Rural: Fringe	7	100% (7)	2258	100% (2258)	4%	4%	70%	70%	158	10
Knox	Suburb: Large	89	100% (89)	59236	100 % (59236)	26%	26%	50%	50%	3,936	232
Lebanon	Town: Fringe	6	33% (2)	3772	31% (1181)	33%	33%	62%	56%	238	13
Lexington	Town: Distant	2	100% (2)	963	100% (963)	32%	32%	59%	59%	78	5
McMinn	Rural: Fringe	9	100% (9)	5926	100% (5926)	90%	90%	63%	63%	353	17
MNPS	City: Large	161	13% (21)	82806	19% (16053)	69%	79%	73%	83%	5,496	288
Putnam	Town: Remote	21	100% (21)	11141	100% (11141)	17%	17%	58%	58%	709	50
Shelby	City: Large	290	3% (10)	149832	5% (8174)	80%	86%	69%	69%	9,281	540
South Carroll**	Rural: Distant	1	100% (1)	400	100% (400)	13%	13%	62%	62%	36	2
Tipton	Town: Fringe	14	64% (9)	11587	53% (6120)	24%	35%	58%	65%	736	47
Trousdale	Rural: Distant	3	100% (3)	1262	100% (1262)	18%	18%	57%	57%	89	5

Source: National Council on Education Statistics (2015) and Tennessee State Report Card (2014)

*The state report card does not report teacher/administrator counts at the school level. District-level counts are reported.

**South Carroll was included in the evaluation from 2010-2014. After the 2013-14 school year, they no longer used their strategic compensation program due to insufficient funding after the grant period.

In 2014-15, the 13 participating LEAs included 686 total schools. Of those, 191 schools participated in a strategic compensation program funded by TN TIF, IAF, and/or CSF.

Student enrollment in participating schools in 2014-15 was 119,542 or 12 percent of total state public school enrollment. Students in participating schools accounted for 12 percent and 13 percent of the state’s economically disadvantaged and minority students, respectively. During the 2014-15 school year, 59 percent of students in participating schools were economically disadvantaged compared with 58 percent of all public school students in the state. Minority students accounted for 39 percent of students in participating schools compared with 35 percent of all public school students in the state.

TABLE 2.2 – Scope and Funding of District Compensation Models, CSF, IAF, and TN TIF, 2010 Cohort

	Grant			Certified Personnel in Program Schools	Model Type	Total Grant Implementation Funds for 2014-15
	CSF	IAF	TIF			
Bradford	x		x	50	Bonus	\$44,885
Hamilton			x	578	Bonus	\$0*
Hollow Rock-Bruceton	x		x	54	Bonus	\$43,680
Johnson			x	173	Bonus	\$145,600
Knox		x	x	4792	Bonus	\$432,250
Lebanon			x	84	Bonus	\$50,000
Lexington	x	x	x	78	Bonus & Salary	\$64,610
McMinn			x	408	Bonus	\$328,510
MNPS			x	1180	Bonus	\$0*
Putnam		x	x	841	Bonus & Salary	\$314,860
Shelby			x	544	Bonus	\$431,710
Tipton			x	442	Bonus	\$250,000
Trousdale	x	x		97	Bonus & Salary	\$0**

*TDOE did not allocate additional funds to Hamilton County Schools or MNPS due to their retaining sufficient carry-over funds from previous years to fund their program in 2014-15.

**Trousdale County Schools only received an IAF grant that ended after the 2013-14 school year. In 2014-15, Trousdale County Schools continued to operate the strategic compensation program developed during the grant period with district funds.

Chapter 3: Descriptive Analysis of TIF Payouts

Components of District Plans

Within broad state and federal guidelines, participating districts had considerable flexibility in the design of their strategic compensation systems. To document differences across program structures, LEAs provided data from 2011-12 to 2014-15 detailing the individual components of their compensation systems and the payouts awarded to individual teachers on the basis of those components.¹⁴ In this chapter we describe districts' 2014-15 compensation plans along two key dimensions: (1) the type of performance rewarded and (2) unit of accountability. Key findings include:

- In 2014-15, eleven of the thirteen participating districts used a measure of student test score growth in their strategic compensation systems. The next most frequently used measures were teachers' summative evaluation ratings (8 of 13 districts) and student test score levels (7 of 13 districts).
- Only one district, McMinn County, did not use any measures of student test performance.
- Across all districts, payouts were awarded largely on the basis of individual- and school-level performance. Three districts awarded participants on the basis of within-school team performance and two on the basis of district-level performance.

Performance Measures

In 2014-15, district compensation systems used, on average, 11 different measures of teacher and administrator performance, ranging from as few as 3 to as many as 42 measures in Johnson and Putnam counties, respectively.¹⁵ To facilitate parsimonious comparisons between the types of performance measures used by each district, the following classification scheme (shown in Table 3.1) was developed:

¹⁴ One district, South Carroll, did not respond to our request for this information.

¹⁵ Putnam County's use of 42 different measures is exceptional. This number is mostly driven by the district's use of grade-and-subject specific student growth measures (e.g., Grade 1 Math, Grade 2 Math, Grade 3 Math), which account for 38 of the district's 42 total performance measures. The unusually high number of measures is largely a matter of definition rather than an indication of substantive differences in the outcomes the compensation system is designed to incentivize.

Table 3.1. Performance Measure Classifications

Category	Measure Type
Student Test Scores	AYP Test score growth (longitudinal) ¹⁶ Test score level Change in test scores (successive cross-sections)
Teacher Evaluation Scores	Teacher Observation Evaluation Score Teacher Summative Evaluation Score
Teacher Qualifications/Effort	Graduate Degree/Coursework Professional Development Participation Position-based ¹⁷ Teacher Effort
Student Graduation/Attendance Rates	Student Graduation/Attendance Rates

Table 3.2 displays the number of measures in each of these categories, by district. There are important similarities across systems. In all but one district (McMinn), the strategic compensation plan includes some measure of student test performance; in fact, all but two districts (McMinn & Knox) use some measure of Student Test Growth, such as an individual- or school-level TVAAS score. Nine of the thirteen systems use either a teachers' summative evaluation score or observation score.¹⁸ Most districts use some measure of teacher qualifications or effort, although the specific type of measure used varies. The compensation system used by McMinn County is distinct from the other twelve participating districts in basing awards solely on job assignments and effort (e.g., whether a teacher served as a coach, participated in a professional learning community).

Units of Accountability

Some performance incentives reward individual performance; others are based on the performance of grade-level or subject-area teams, the school as a whole, or even the entire district. The term "unit of accountability" refers to this distinction. In Table 3.3 we show the

¹⁶ Test score growth is a longitudinal measure, tracking an individual student over time. Change in scores is the difference between one year and the next in an aggregate measure of performance (e.g., the change in the percentage of students scoring at the proficient level).

¹⁷ Position-based awards are remuneration for taking on additional duties (e.g., instructional coach, lead teacher, an after-school tutor). Effort-based awards, by contrast, are rewards for working harder, more diligently, or to better effect (e.g., perfect attendance, participating in a professional learning community).

¹⁸ Evaluation scores are based on a formula combining test scores (both level and growth) and observation scores.

number of performance measures by unit of accountability. All thirteen district compensation systems included at least one measure of both individual- and school-level performance, though the ratio of individual- to school-level measures differs across districts (e.g., McMinn's 9:1 individual-to-school ratio compared to Bradford's 1:3 ratio). Three districts (MNPS, Lexington, and Hamilton) included measures of within-school team (e.g., grade or subject teams) performance, with MNPS dedicating 10 of the 18 total measures in its compensation system to measures of team-level performance. Only two districts, Putnam and Tipton, used district-level measures in 2014-15.

Table 3.2. Number of Performance Measures by Measure Type (2014-15)

Measure	Bradford	Hamilton	HRB	Johnson	Knox	Lebanon	Lexington	McMinn	MNPS	Putnam	Shelby	Tipton	Trousdale
Student Test Scores	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
AYP	0	0	0	0	1	0	0	0	1	0	0	1	0
Student Test Growth	5	12	2	2	0	2	1	0	14	38	5	4	1
Student Test Level	6	1	1	0	0	0	2	0	0	2	1	0	1
Student Test Level Change	0	0	0	0	0	0	0	0	0	1	0	0	0
Teacher Evaluation Scores	Yes	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes
Teacher Observation Eval. Score	0	0	1	0	0	0	0	0	0	0	1	0	0
Teacher Summative Eval. Score	2	0	0	1	1	0	1	0	2	1	1	0	1
Teacher Qual/Effort	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes
Graduate Degree/Coursework	0	0	0	0	0	0	0	0	1	0	0	0	1
PD Participation	0	0	0	0	0	1	0	0	0	0	1	0	0
Position-based	0	0	0	0	1	0	0	4	0	0	0	0	1
Teacher Effort	1	0	1	0	1	1	0	6	0	0	0	0	1
Student Grad/Attend Rate	Yes	Yes	No	No	No	No	No	No	No	No	Yes	No	Yes
Student Grad/Attend Rate	1	2	0	0	0	0	0	0	0	0	1	2	0

Table 3.3 Number of Performance Measures by Unit of Accountability (2014-15)

Unit	Bradford	Hamilton	HRB	Johnson	Knox	Lebanon	Lexington	McMinn	MNPS	Putnam	Shelby	Tipton	Trousdale
Individual	6	7	3	2	3	3	2	9	3	38	6	1	5
School	9	4	2	1	1	1	1	1	5	4	4	4	1
Team	0	4	0	0	0	0	1	0	10	0	0	0	0
District	0	0	0	0	0	0	0	0	0	1	0	2	0

Distribution of TIF Payout Amounts

Over the 2014-15 academic year, roughly 7,500 school personnel members from thirteen Tennessee LEAs participated in TIF-funded strategic compensation programs. The payout data for these individuals revealed a number of key findings:

- The thirteen participating districts distributed \$6.7 million in payouts in 2014-15 and a total of nearly \$29 million since 2011-12.
- The average payout amount in 2014-15 was roughly \$1,500. Payouts ranged from \$13 to \$10,000.
- Trousdale County led all districts in average payouts in 2014-15 with average awards of \$3,050. Average payouts in Lexington County were \$850, the lowest average payout in 2014-15.
- Since 2011-12, nearly 70 percent of all payouts have been on the basis of either summative teacher evaluation measures or student test growth-specific measures. In that same time span, 75 percent of payouts have been distributed using individual-level measures of performance.
- Individual awards in the \$1,000-\$2,000 range accounted for 61 percent of total payouts in 2014-15. Awards larger than \$5,000 accounted for roughly 3 percent of payouts.

Payouts by District

A descriptive summary of payouts for each district in 2014-15 is presented in Table 3.4. Nearly six out of ten participating teachers and administrators received a payout in 2014-15, with the average individual total payout amount among award recipients being slightly over \$1,500. An individual total payout is defined as the sum of all payouts received by a participant from a district within a given year.

Table 3.4. Payout Amounts, by District (2014-15)

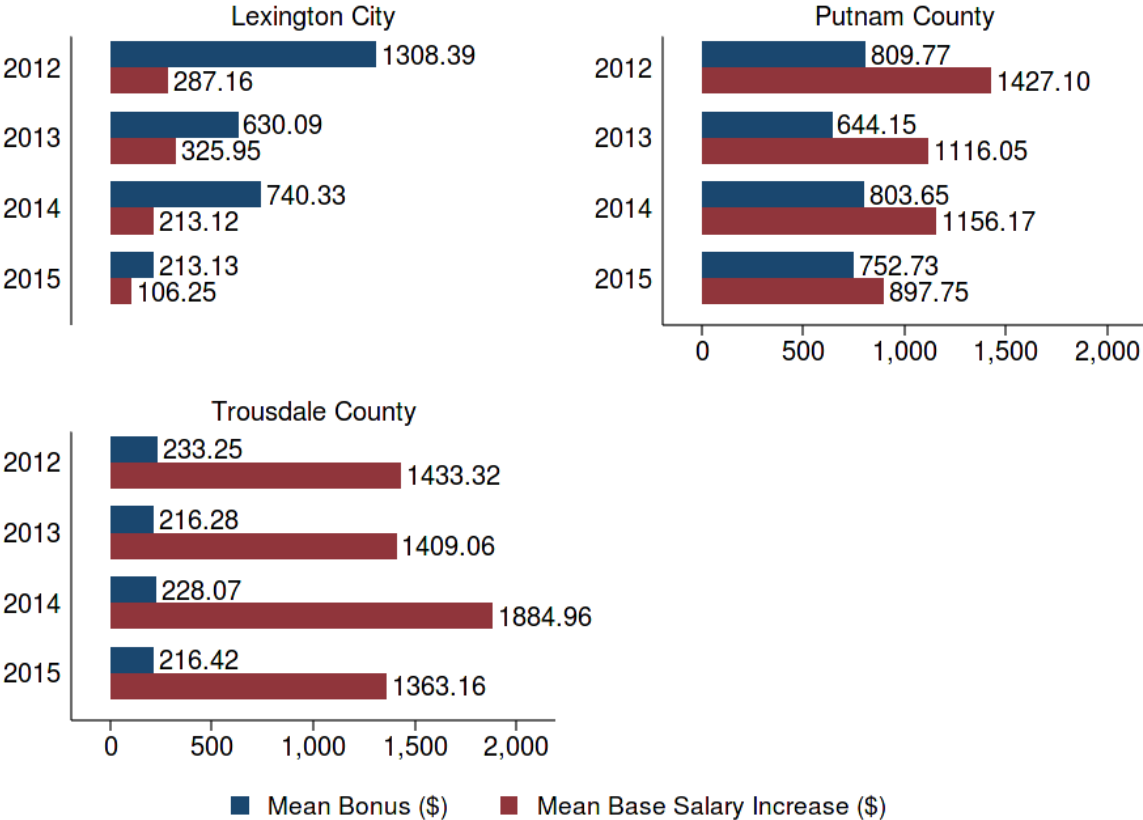
District Name	No. Partic.	% Partic. Winning Award	Total \$ Awarded	Average \$ Awarded	Avg as % of Salary	Min \$ Awarded	Max \$ Awarded
Bradford SSD	44	100.00%	\$51,550.00	,1,171.59	2.81%	\$400.00	\$1,600.00
Hamilton	530	38.49%	\$258,694.67	\$1,268.11	1.06%	\$100.00	\$10,000.00
HRB	36	80.56%	\$44,250.00	\$1,525.86	2.99%	\$400.00	\$3,400.00
Johnson	173	69.36%	\$123,400.00	\$1,028.33	1.67%	\$538.00	\$2,199.00
Knox	3,731	47.52%	\$2,986,604.40	\$1,684.49	1.67%	\$750.00	\$2,000.00
Lebanon	58	100.00%	\$53,362.50	\$920.04	1.19%	\$12.50	\$3,250.00
Lexington	80	37.50%	\$25,550.58	\$851.69	0.69%	\$200.00	\$2,074.88
MNPS	949	64.17%	\$606,726.30	\$996.27	1.22%	\$40.58	\$5,000.00
McMinn	408	22.79%	\$265,000.00	\$2,849.46	1.27%	\$500.00	\$8,000.00
Putnam	686	100.00%	\$1,132,234.37	\$1,650.49	3.51%	\$212.50	\$5,125.00
Shelby	343	98.83%	\$434,300.00	\$1,281.12	2.27%	\$25.00	\$2,850.00
Tipton	336	93.45%	\$571,452.50	\$1,819.91	3.46%	\$500.00	\$3,200.00
Trousdale	112	51.79%	\$176,913.25	\$3,050.23	4.29%	\$1,250.00	\$7,188.60
All	7,486	58.20%	\$6,730,038.57	\$1,544.65	1.86%	\$12.50	\$10,000.00

By district, average payouts were highest in Trousdale County, where the county’s 58 payout winners (among 112 participants) averaged over \$3000 in payouts. Award winners in Lexington County, in contrast, earned little over \$850 on average. Proportionally, payout amounts typically comprised one to five percent of participants’ total annual salary, with the average being 1.8 percent. Individual payouts ranged from less than \$20 (in Lebanon County) to \$10,000 (in Hamilton County). Historically, the maximum annual payout earned by a single participant was \$14,800 (McMinn County, 2013). Putnam County led all LEAs in district-total payouts in

2014-15, distributing \$1.1 million of the \$6.7 million that was distributed across all participating districts during 2014-15.

Three districts also implemented alternative salary schedules. All teachers new to the district were placed on the alternative schedule. Veteran teachers were given the option to switch to the new schedule or remain on the old “step-and-lane” schedule, with step increases based on longevity and lane increases for completing advanced degrees. The alternative schedules, by contrast, tied increases to teachers’ summative evaluation scores. Figure 3.0 breaks down the average award in these districts into these two components.

Figure 3.0 Awards in Districts Implementing Alternative Salary Schedules

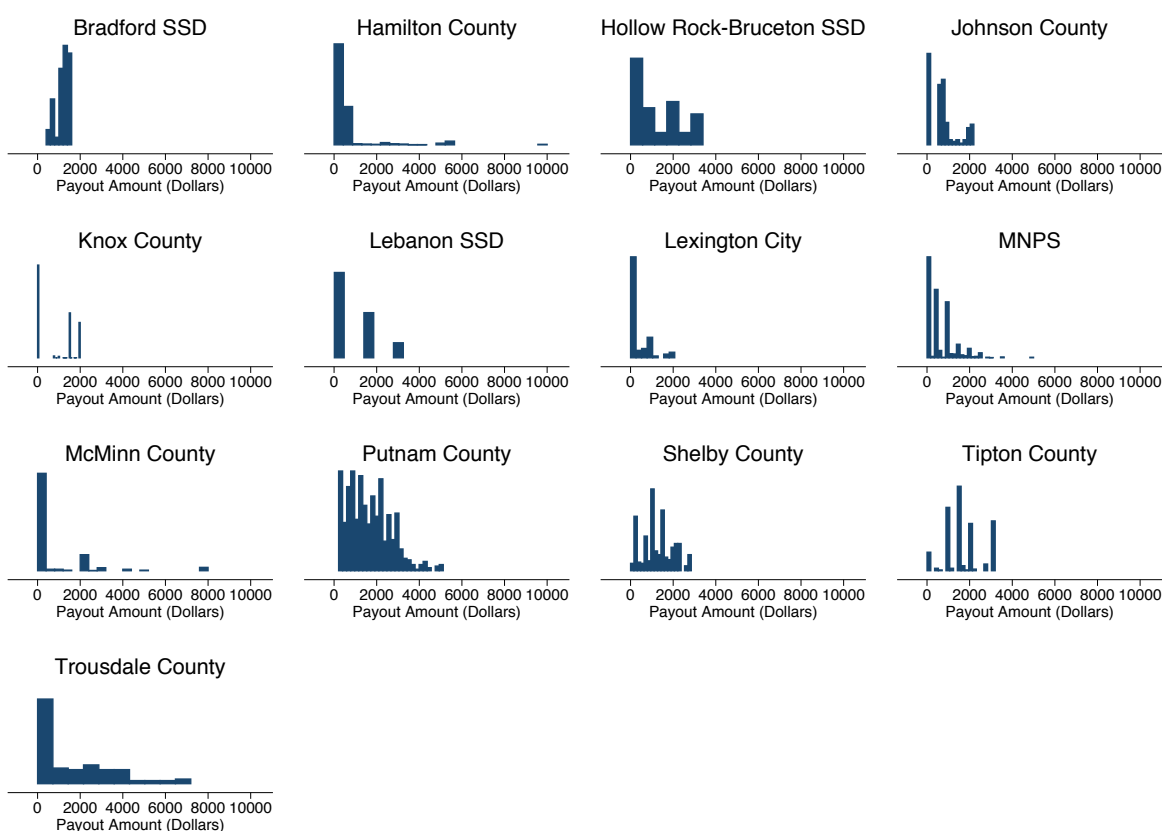


The probability of earning an award, contingent on participation, varies across districts. In three districts, Bradford, Lebanon, and Putnam, all teachers listed as participants earned a non-zero amount during the 2014-15 school year. Nearly all participating teachers (99 percent) received awards in Shelby. By contrast, Hamilton (38 percent), Knox (48 percent), Lexington (38 percent),

and McMinn (23 percent) were all districts in which fewer than half of the individuals listed as participants earned a financial award during the school year.

Similarly, districts varied in the extent to which payouts were differentiated among personnel. Distributions of individual payouts are depicted in Figure 3.1. In Putnam County, payout levels in 2014-15 varied smoothly from roughly \$200 to \$5,000. In contrast, 98 percent of participants in Knox County received \$0, \$1,500, or \$2,000 in 2014-15, resulting in the clustering observed in Figure 3.1.

Figure 3.1. Distribution of Payouts (2014-15)

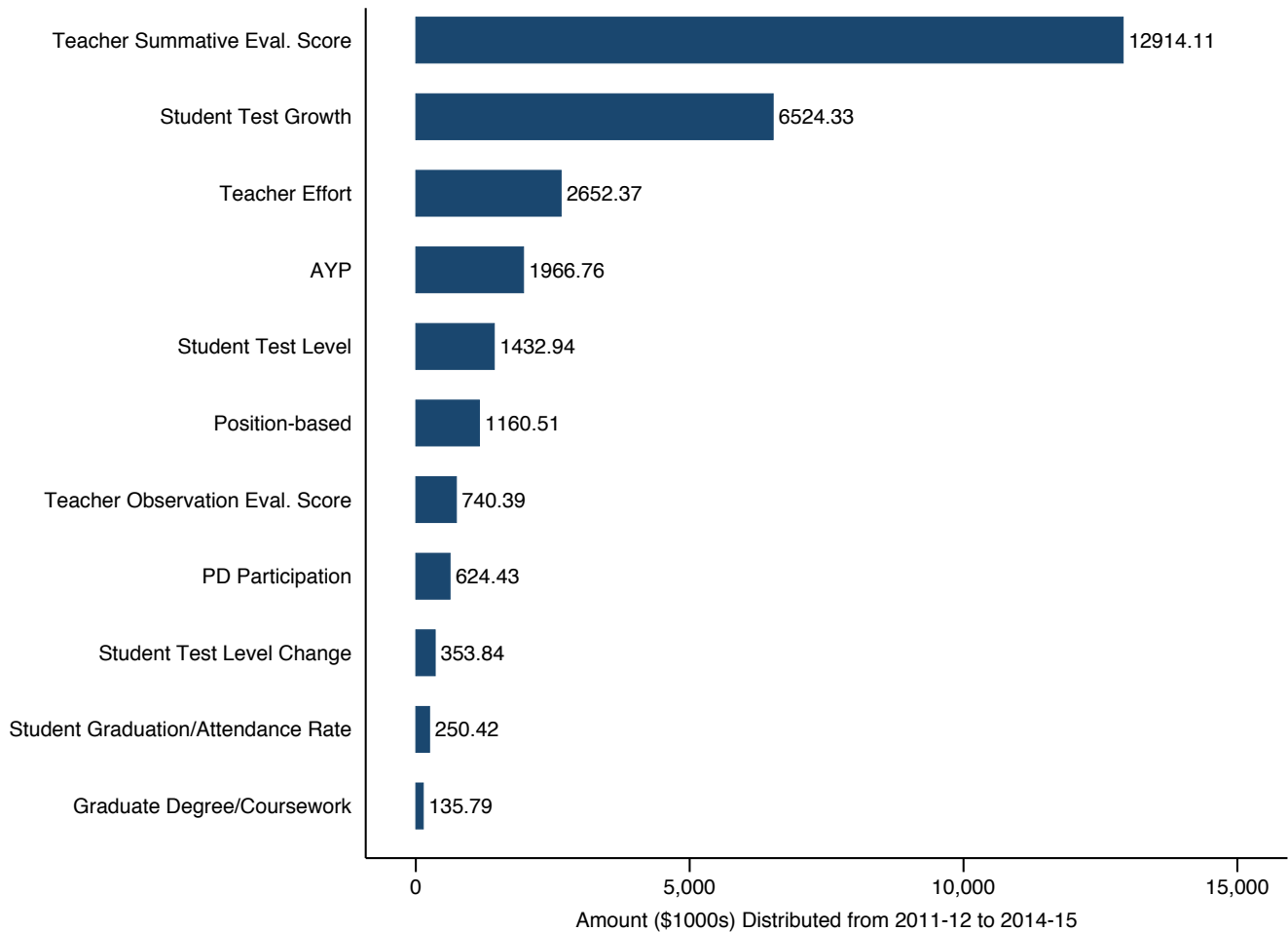


Payouts by Performance Measure

Figure 3.2 depicts total payout amounts across all thirteen districts from 2011-12 to 2014-15, by type of performance measure. Nearly 70 percent of \$29 million that has been awarded since 2011-12 was distributed on the basis of teachers' summative evaluation scores (\$12.9 million) or student test score growth (\$6.5 million). The bottom three types by amounts paid out

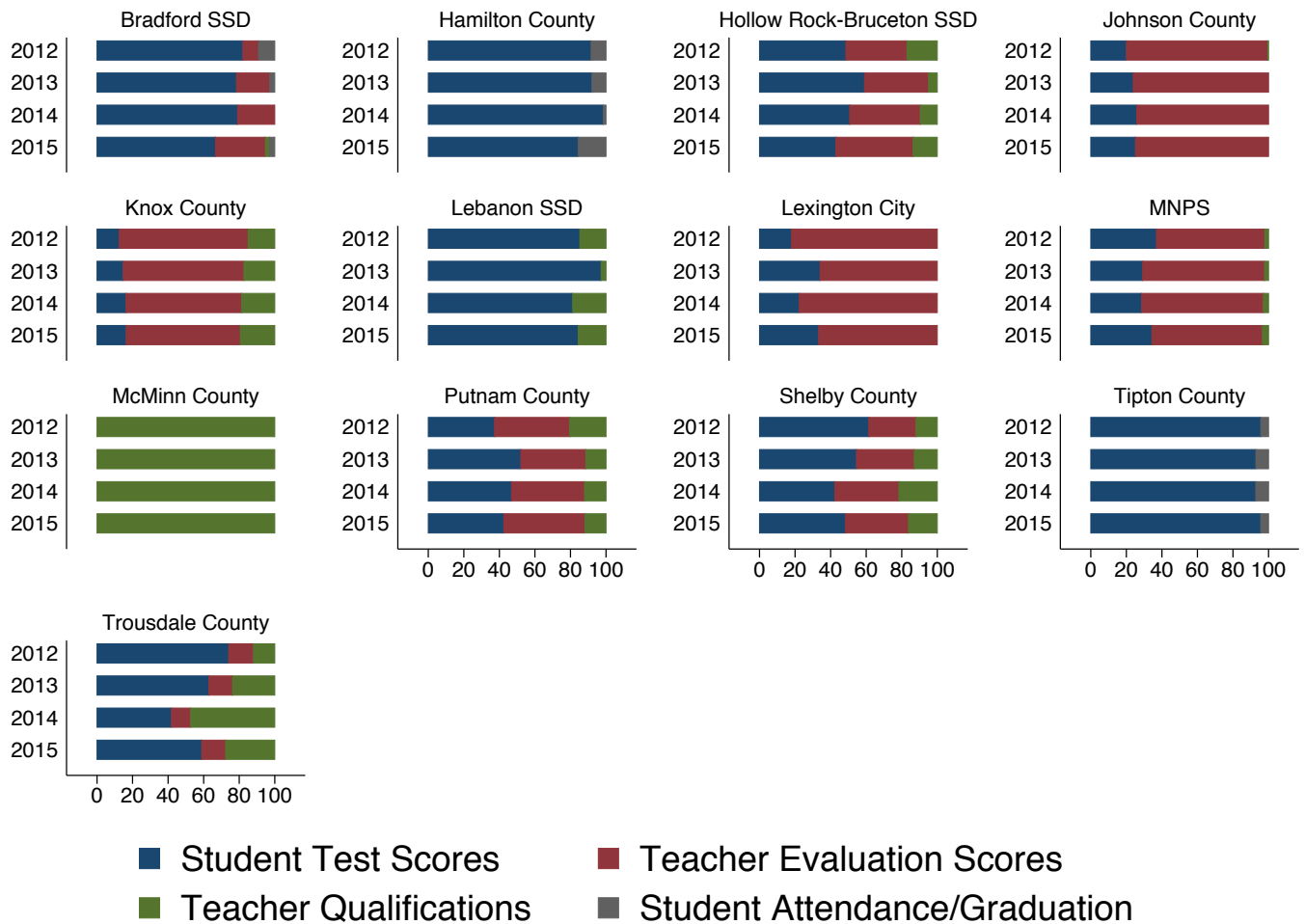
(graduate degree/coursework, student graduate/attendance rate, student test level changes) totaled less than \$1 million combined.

Figure 3.2 Total Payout Amounts by Performance Measure (2011-12 to 2014-15)



Similar patterns are evident at the district level. Figure 3.3 breaks down awards by type, using the same categories as 3.1. Each colored segment represents the proportion of total award spending (in that district and year) distributed on the basis of a given type of performance measure, with all segments summing to 100 percent. With exception of McMinn County, most payouts were based either on student test scores (blue) or teacher evaluations (red); McMinn, as noted previously, paid out bonuses solely on the basis of positional assignments and teacher effort-based measures. Within districts, the distribution of awards across categories appears fairly consistent across time.

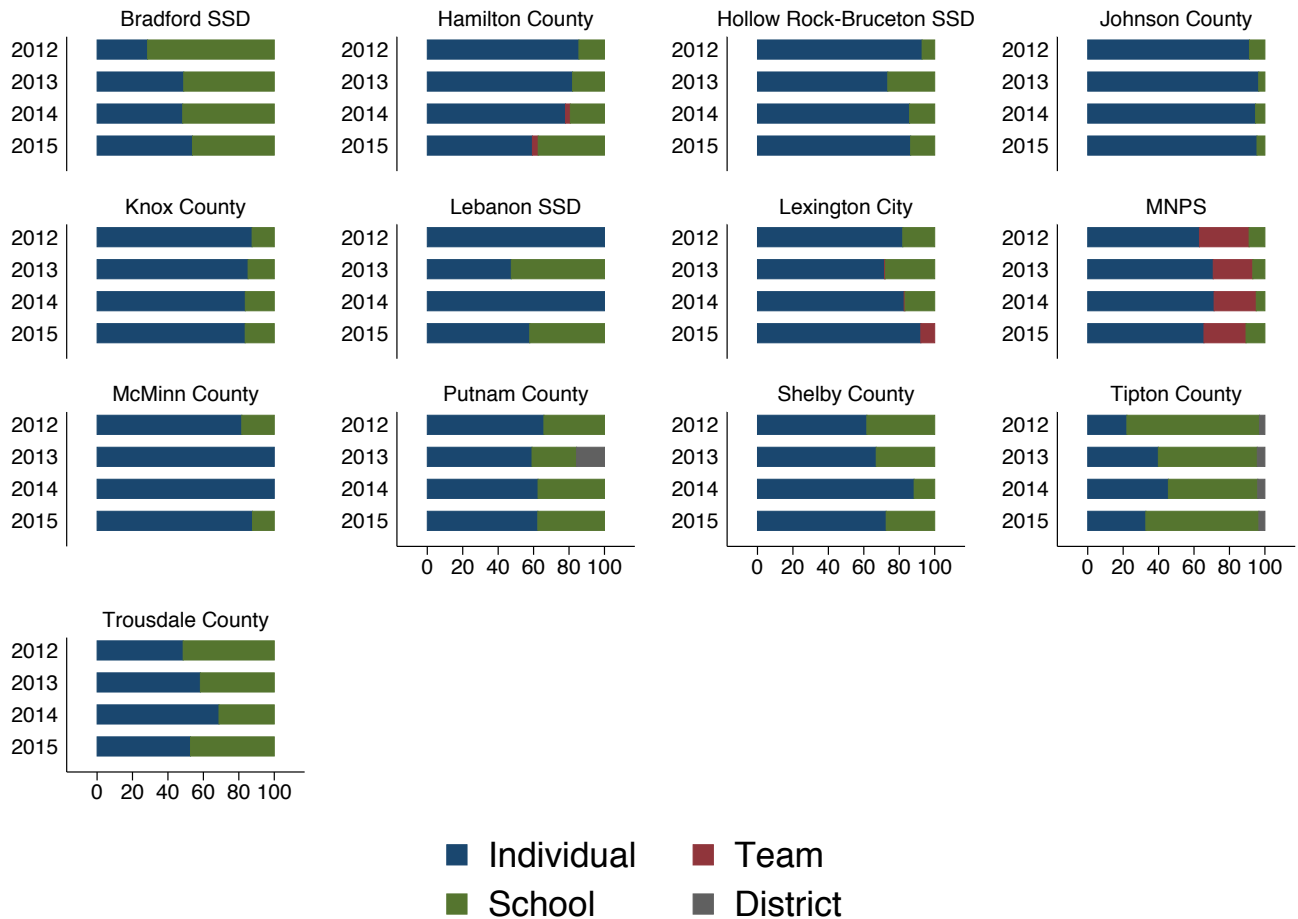
Figure 3.3 Proportions of District Payouts, by Performance Measure (2011-12 to 2014-15)



Payouts by Unit of Accountability

Roughly 75 percent (\$21.4 million) of total payouts from 2011-12 to 2014-15 were awarded on the basis of individual-level measures, with 22 percent (\$6.4 million) distributed according to school-level performance. Team- (\$764,000) and district-level (\$194,000) payouts accounted for the remaining spending. Accordingly, the vast majority, if not all, of the payouts within specific districts were based on individual- and school-level performance (see Figure 3.4). Bradford, Tipton, and Trousdale counties distributed a larger proportion of their payouts using school-level performance measures; individual-level measures were the major source of payouts in the other ten districts. Only one district, MNPS, distributed a significant portion of its payouts on the basis of team-level performance.

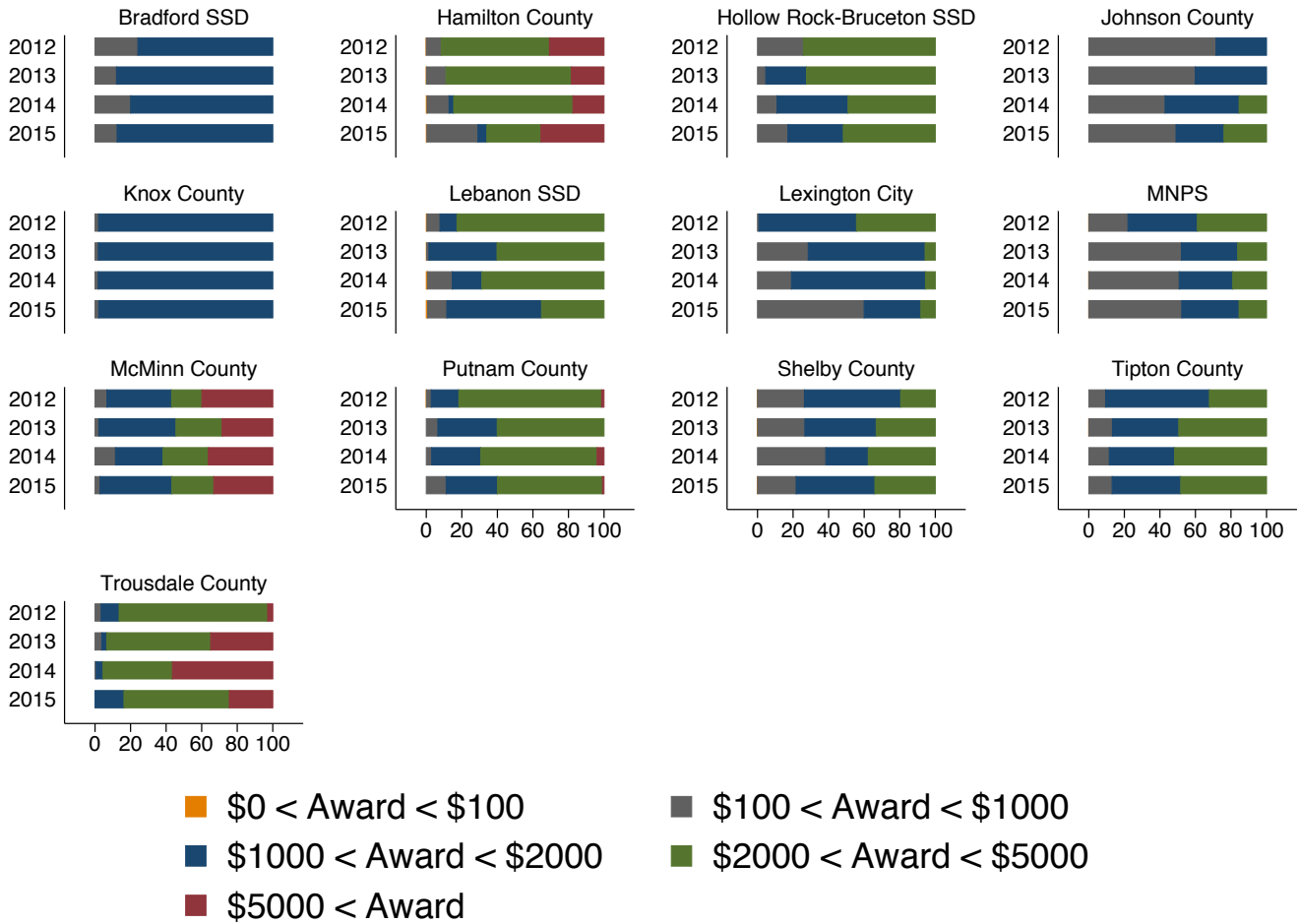
Figure 3.4 Proportion of District Payouts by Unit of Accountability (2011-12 to 2014-15)



Payouts by Award Size

A question of interest is whether the distribution of payouts in participating districts has been equitable. Are payouts widely dispersed across a wide set of award winners? Or, are the majority of payouts distributed in large sums to relatively few individuals? One method of summarizing payout distributions would be to create categories based on quartiles, i.e., the proportion of total payouts given to bottom 25 percent, middle 50 percent, and top 25 percent of award winners. However, this classification scheme was not feasible due to a combination of small numbers of participants and limited variation in payout sizes in certain districts. Instead, the following nominal categories were created on the basis of identifying natural breaks in the sample-wide distribution of payouts: (1) less than \$100, (2) between \$100 and \$1,000, (3) between \$1,000 and \$2,000, (4) between \$2,000 and \$5,000, and (5) larger than \$5,000.

Figure 3.5. Proportion of District Payouts by Size of Award (2011-12 to 2014-15)



Using these categories, most payout spending by participating districts in 2014-15 was distributed in the form of awards in the \$1,000-\$2,000 range (see Figure 3.5). Specifically, 61 percent of total payouts statewide were paid out in the form of individual total awards ranging from \$1,000 to \$2,000, followed by 22 percent paid out in \$2,000-\$5,000 awards and 13 percent paid out in \$100 to \$1,000 awards. The preponderance of awards in the \$1000 to \$2,000 range is unsurprising given that the statewide 2014-15 average, roughly \$1,500, falls within that range. Payouts in the largest dollar amount category, awards greater than \$5,000, accounted for 3 percent of total spending across the state.

Figure 3.5 also includes these proportions specific to individual districts for each year. Each colored segment of the stacked bar represents the proportion of total district payouts in that year that was distributed in the form of an individual payout of that size. The distribution of

payout amounts in a number of districts deviates from the preponderance of \$1,000-\$2,000 awards observed statewide. Three districts, Hamilton (35 percent), McMinn (33 percent), and Trousdale (24 percent), saw large award winners (those earning individual total awards exceeding \$5,000) comprise a sizable portion of total award payouts. On the other end of the payout size range, Lexington County (60 percent), MNPS (52 percent), and Johnson County (49 percent) appear to be districts in which payouts are largely distributed in the smaller \$100-\$1,000 range. Knox County, as previously mentioned, distributed 98 percent of its payouts in 2014-15 in the form of \$1,500 or \$2,000 awards, leading to the nearly unicolor distribution shown in Figure 3.5.

Payouts by level of teacher effectiveness

We close this discussion with the distribution of payouts over levels of teacher effectiveness. Results are displayed graphically in Figure 3.6. There is a strong relationship between the average current year payout and a teacher's level of effectiveness (LOE) rating for the same year. Teachers rated "5" received on average nearly \$1,800 across all districts and years, while the average teacher with a rating of "1" received only \$63. This relationship is unsurprising, given that many awards are tied directly or indirectly to these ratings.¹⁹

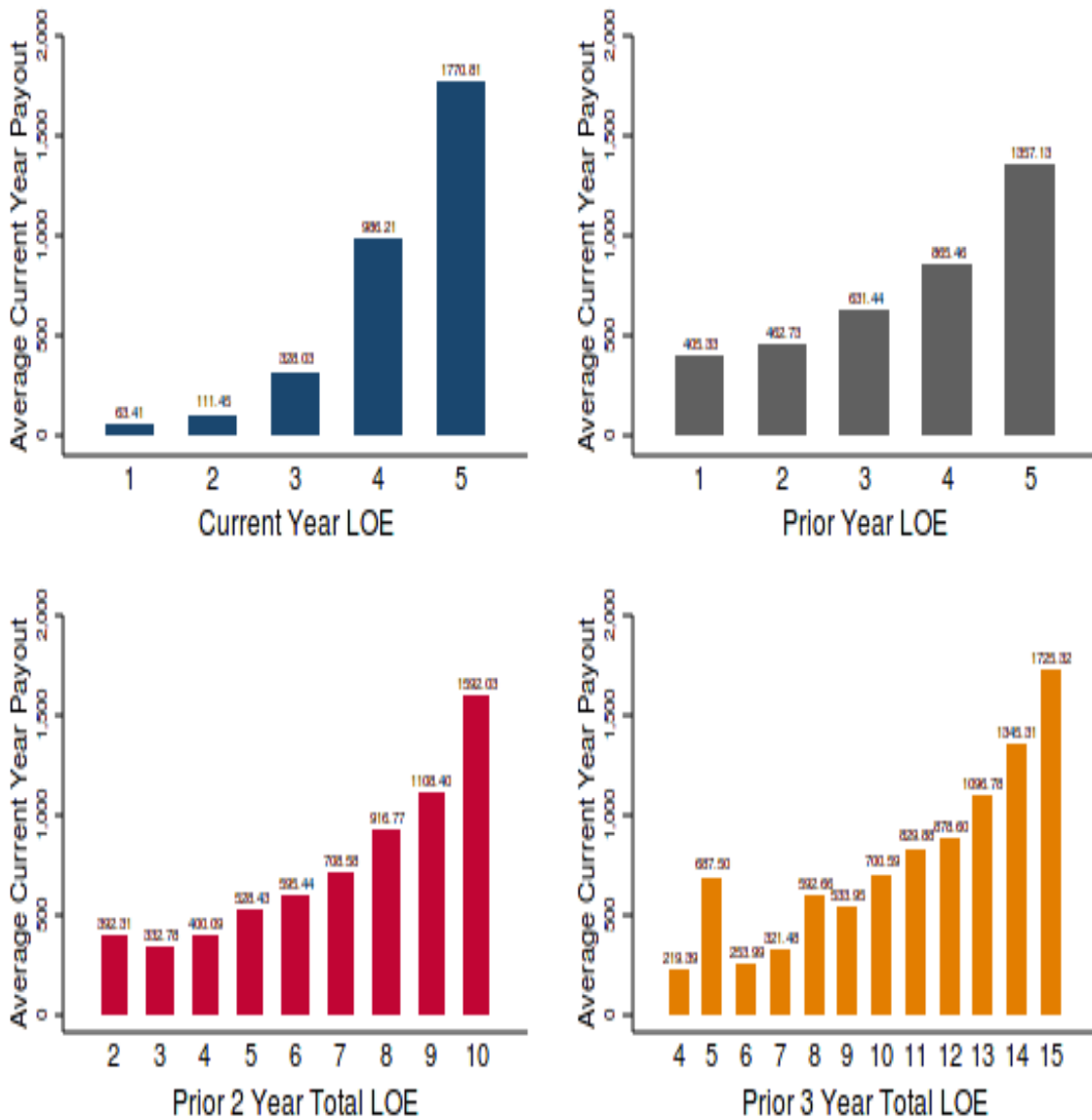
The rating a teacher receives in any given year may not be an accurate measure of underlying effectiveness. Test scores are noisy measures of student achievement, as are measures of growth constructed from those scores. Classroom observers evaluate teachers on the basis of a few visits. What they see may not be representative behavior, nor is the rating they assign necessarily the same as that which another observer would give. For these reasons it is of interest to compare the distribution of awards in any given year to past measures of effectiveness, particularly when multiple years are averaged together, improving measurement accuracy. Figure 3.6b shows current year payouts by LOE in the immediately prior year; Figure 3.6c shows current payouts by the sum of the LOE ratings in the prior two years; Figure 3.6d shows current payouts by the sum over the prior three years. We continue to see a strong relationship between payouts and teacher ratings, though a comparison of Figure 3.6a with 3.6d shows a tendency for awards to be more nearly equal than would be the case if teachers received the same rating in the current year that they have received in the past. Inasmuch as the LOE in a single year is a noisier measure of a teacher's true effectiveness than average performance over the prior three years, we can use the difference between Figures 3.6a and

¹⁹ An example of an indirect tie would be a bonus based on a teacher's TVAAS score, given that TVAAS scores are a component of the overall evaluation score.

3.6d to approximate the proportion of total payments that are awarded on the basis of chance factors. The result is reassuringly small: less than 8 percent.²⁰

²⁰ The calculation uses the relationship in Figure 3.6d to impute payouts in 2015. The difference between actual and imputed payouts is attributed to measurement error. For example, a teacher who has received a rating of “3” in each of the past three years receives a bonus of \$533 in the current year (Figure 3.6d). If he receives a “3” again he earns only \$328, according to Figure 3.6a. The difference arises because many of the teachers receiving ratings of “3” in the past receive a higher rating in the current year. If this discrepancy is due to measurement error in the current year rating, then the difference of \$205 (= 533-328) is the part of the payout based on chance factors. Inasmuch as some of this discrepancy is due to changes in true teaching effectiveness, our calculation overstates the payout associated with chance: in this case, \$205 would represent an upper bound on the latter.

Figure 3.6 Distribution of Awards by Current and Previous Levels of Effectiveness (LOE)



Chapter 4: Educator Perceptions and Attitudes about Strategic Compensation in their Schools: Results from Analyzing Survey Responses

Beginning with the 2011-12 school year, the Consortium has administered an annual survey to all certified personnel in schools participating in strategic compensation programs as part of the CSF, IAF, and TN TIF 2010 cohort. The Strategic Compensation Survey (SCS) contains questions in five areas of inquiry: (1) awareness of the strategic compensation program and its components, (2) attitudes regarding program design, (3) perceptions about program implementation and impact, (4) reactions to the prior year's payouts, and (5) general attitudes about compensation reform. Survey results through 2013-14 were analyzed and reported in *Evaluation of Tennessee's Strategic Compensation Programs: Interim Findings on Design, Implementation, and Impact in Year 3 (2013-14)*.

This report presents results from surveys administered in spring of 2015 and spring of 2016. School year 2014-15 was the last year of full funding available to the cohort of participating schools; beginning in 2015-16, districts were expected to fund their own strategic compensation programs. Following a brief section on survey administration and response rates over time, the remainder of the chapter will focus on the research questions listed below.

1. How have perceptions and opinions changed over time?
2. How do perceptions and opinions vary by type of position?
3. How do perceptions and attitudes vary based on the degree incentive pay expectations were met?
4. How do perceptions and attitudes vary based on perceived fairness of employee evaluation processes?
5. How do perceptions and attitudes vary based on characteristics of performance pay plans?

Survey Responses over Time

Administrative data were used to identify certified staff in schools participating in strategic compensation efforts each year a survey was fielded. Staff members with valid email addresses were sent invitations to complete the SCS each spring. Reminder emails were periodically sent

to staff members who had not yet responded to the survey throughout the two to three month period when the survey was available. Table 4.1 presents the total number of survey respondents by position type and year. The number of responses peaked in spring 2013. It was smallest in 2016, a year in which some participating districts discontinued or scaled back their SC programs as funding expired. Annual samples were always dominated by teacher respondents.

Analysts examined the degree to which survey respondents were similar to all those invited to take the surveys in spring 2015. Generally, characteristics of respondents were similar to the characteristics of all invited personnel in schools participating in SC programs. [Appendix IV1](#) presents results of testing the representativeness of 2015 survey respondents.

Table 4.1 Responses to Strategic Compensation Survey by Year and Position Type

	Teachers	Administrators	Certified		Total
			Instructional Staff	Other certified School Staff	
Fall 2011	3,926	265	218	349	4,758
Spring 2013	4,437	315	290	390	5,432
Spring 2014	3,507	200	290	343	4,340
Spring 2015	3,963	293	253	354	4,863
Spring 2016	2,396	206	182	230	3,014

Response rates on the spring 2016 survey declined by more than a third as grants expired and districts scaled back their strategic compensation programs. Due to the much smaller sample and the change in the relative response rates across districts, the results from the 2016 administration have not been evaluated for the degree to which they are representative of all personnel in participating schools in 2015-16.

Results Over Time and By Position Type

Results for the following two research questions are presented in this section.

1. How have perceptions and opinions changed over time?
2. How do perceptions and opinions vary by type of position?

Figure 4.1 shows the degree to which teachers agreed with several items about SC program implementation over time. The top bar for each item is from the earliest survey and the

bottom bar presents results for the item the last year it was included on the survey. Two patterns are evident: first, over time fewer teachers agreed that the SC program would cause extra paperwork and/or take time away from instruction. Between 60% and 70% of teachers agreed with these statements in 2011; by spring 2016, only about 40% of responding teachers agreed or strongly agreed with those statements.

Responses to other statements about SC program implementation followed this general pattern: an increase in 2013 in the proportion of teachers expressing favorable views of SC, a small decline in 2014, another small decline in 2015, and no change or a slight recovery in 2016. It is interesting that the slight recovery in 2016 appears on items related to general satisfaction with the SC program operation, support from the community, and financial resources to sustain the program. The uptick in positive responses probably reflects the fact that teachers from schools that continued their programs in 2016 were more likely to respond. Trends through 2015 are more reliable and generalizable, as samples were larger and all respondents were from schools still using strategic compensation; results for 2016 are skewed toward the few districts that continued to operate their SC programs after grant funding was curtailed or suspended.

Figure 4.1 Teacher Perceptions of SC Program Implementation

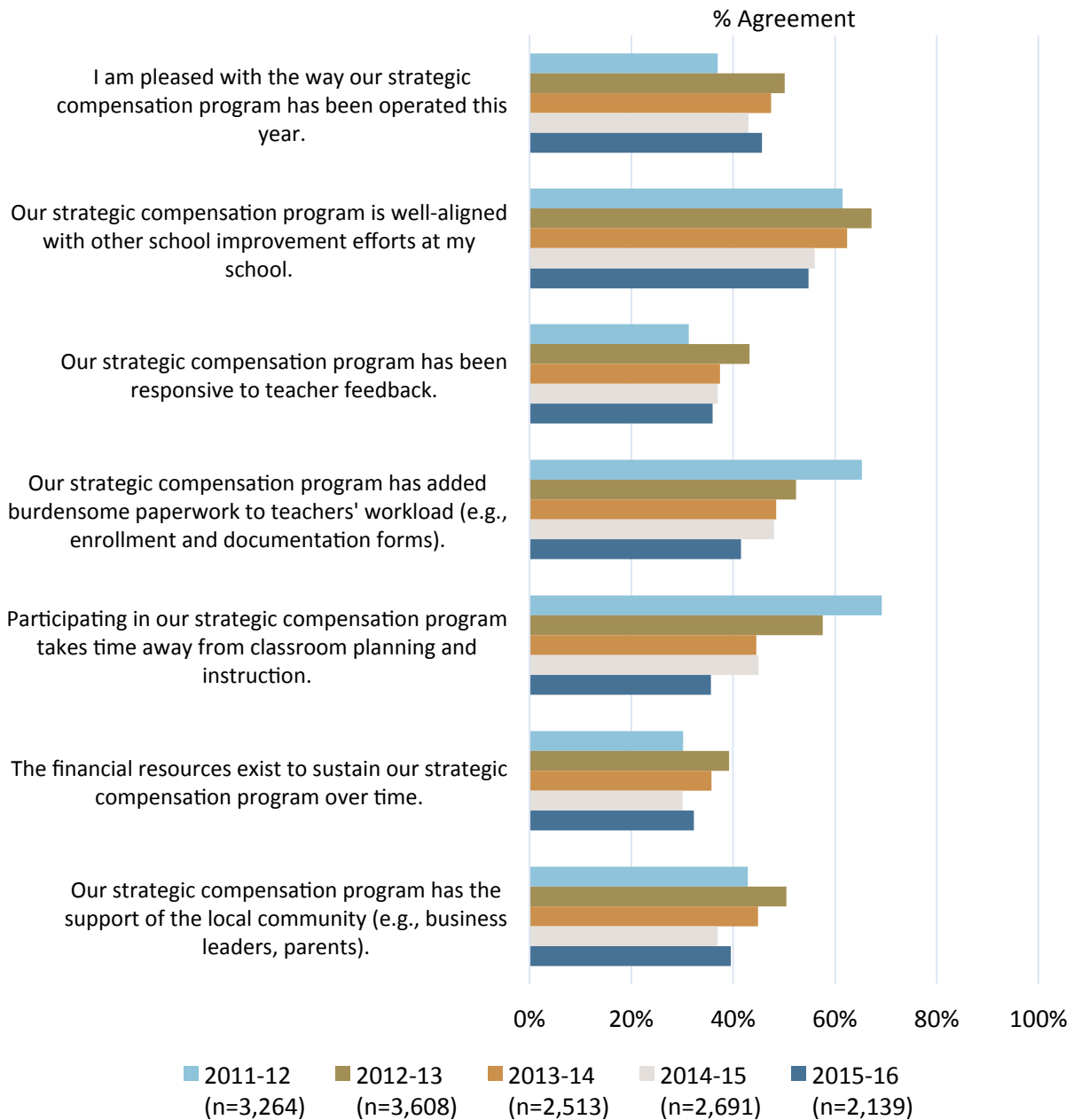
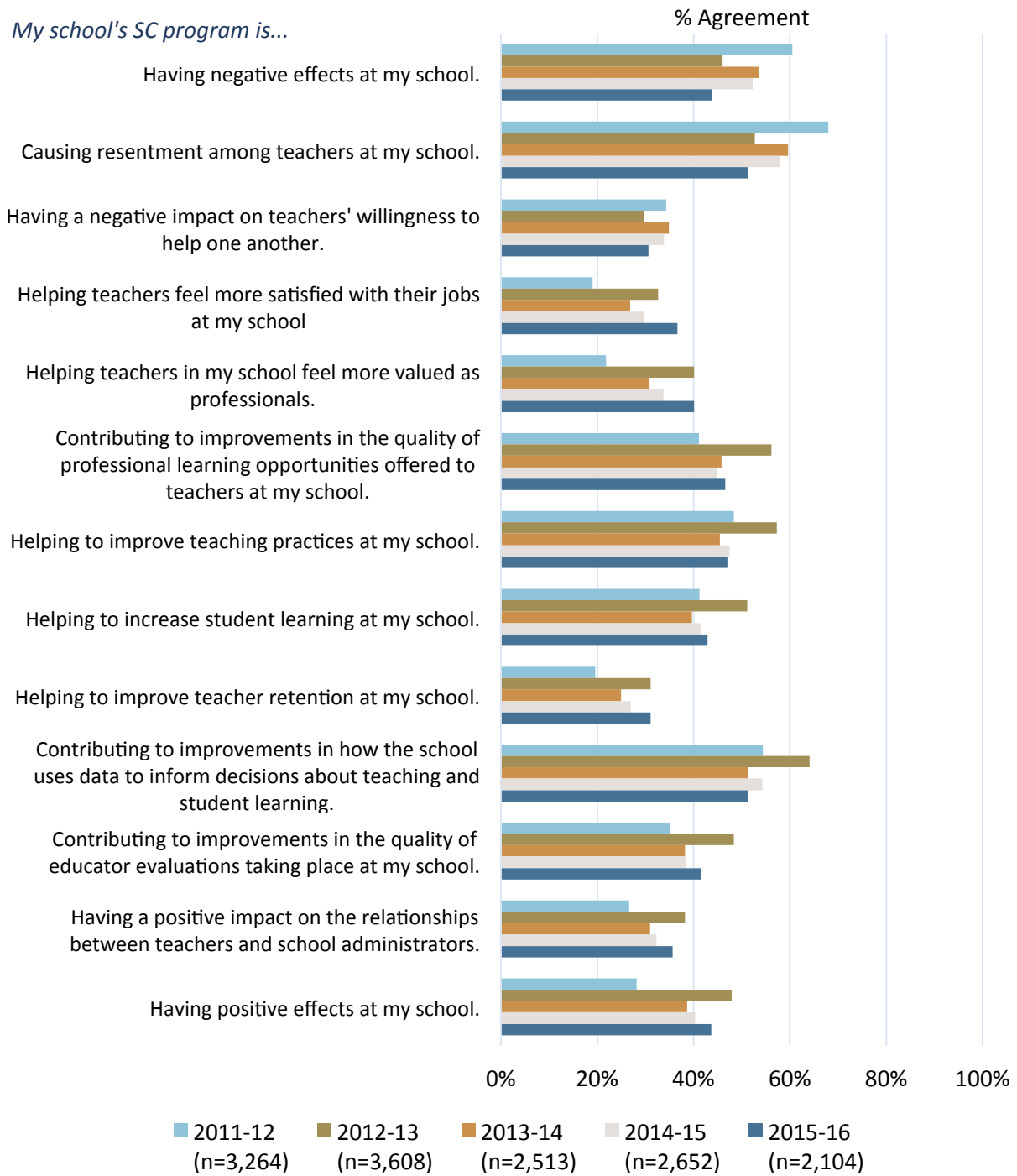


Figure 4.2 shows the proportion of teachers agreeing with statements about perceived program impacts. The pattern over time is similar to that for teachers' perceptions of implementation in the preceding figure. Responses were most negative in the first year, most positive the year after, then somewhat more negative once more in 2013-14 and 2014-15, with an uptick (or no change) in the final year.

Figure 4.2: Teacher Perceptions of SC Program Impacts Over Time



We now consider how responses varied by position type. Rather than examine responses to individual items, we have grouped items into clusters measuring similar dimensions of the SC program.²¹ Figure 4.3 shows average responses over time for six of these clusters. Staff participating in the SC program are distinguished by their position within the school: administrators, teachers, certified instructional staff, and other certified staff.

In all years school administrators expressed the most favorable views of SC and its impact in their schools. Teachers generally held the least favorable views. Certified instructional staff who responded to the survey were somewhat less favorable than school administrators, but generally more positive in their perceptions and attitudes than teachers or other certified staff.

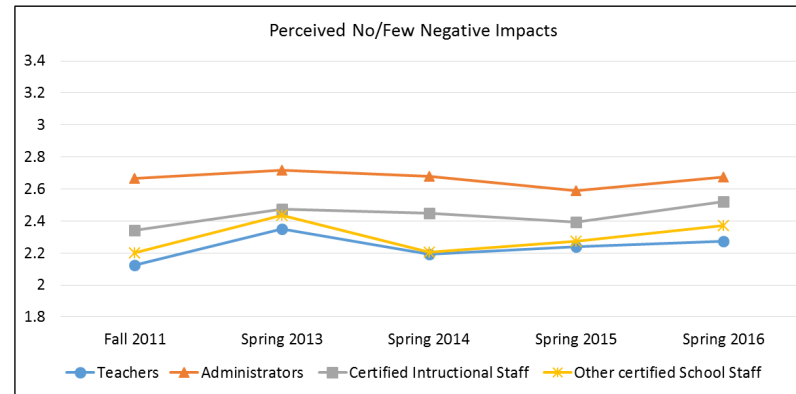
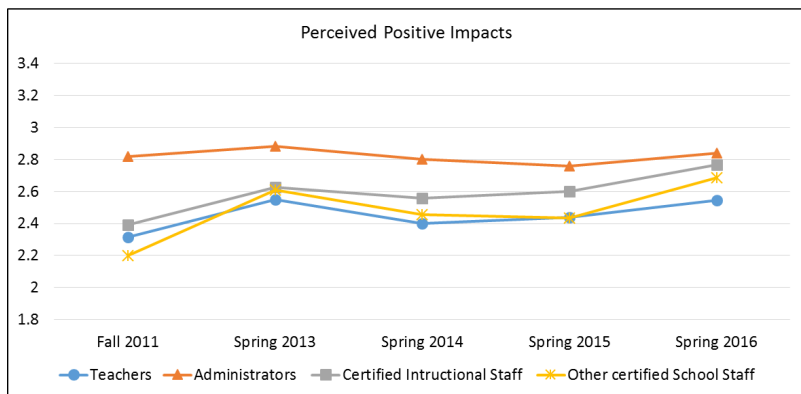
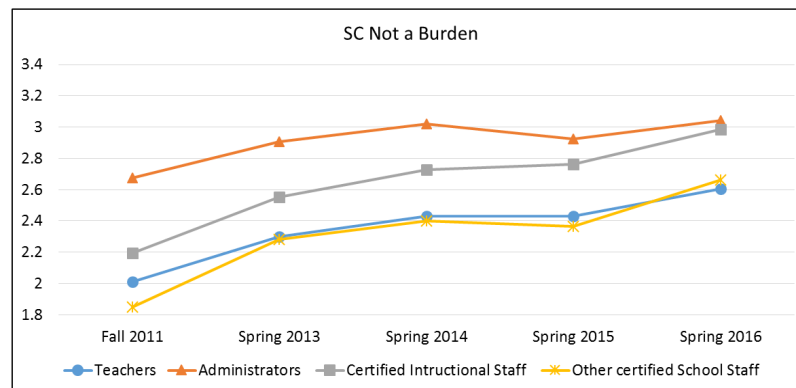
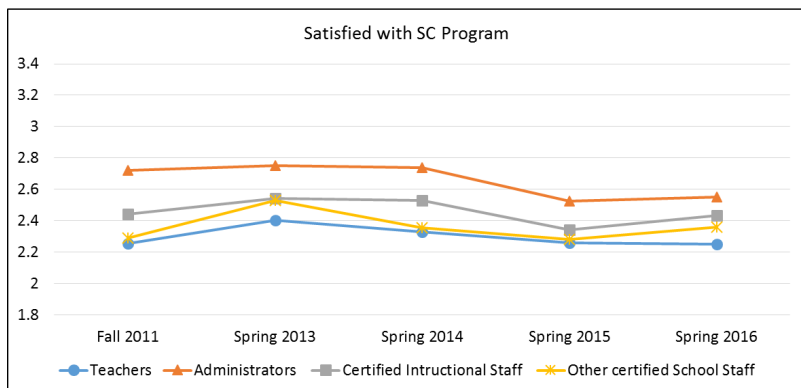
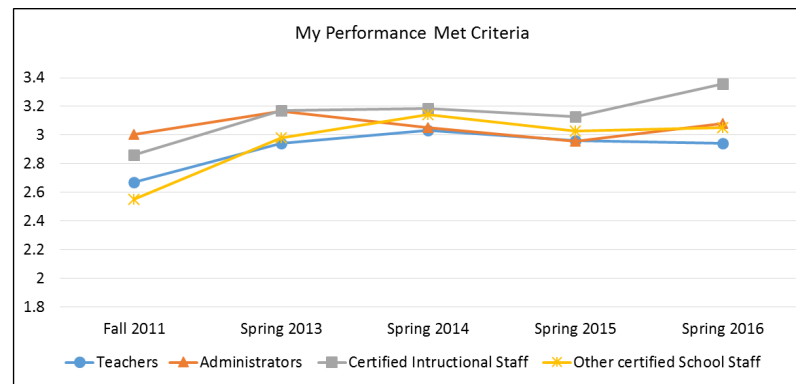
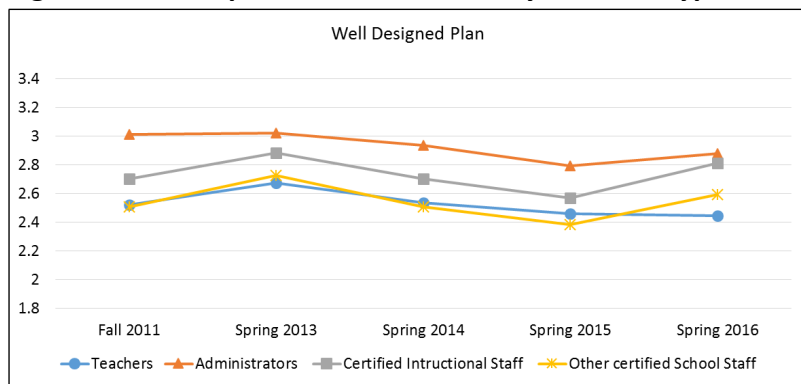
These four groups differed least when asked about performance relative to the criteria for receiving an award (“My Performance Met Criteria”). Teachers were more negative than other personnel. Nor did their views turn up in 2016, in contrast to the other three groups. Administrators fell to about the same level as teachers in 2014 and 2015 before rebounding slightly in 2016. For all four groups, the change from 2015 to 2016 was in the same direction as the change in items related to program design and satisfaction.

Average responses over time to other clusters of related items reflect to varying degrees the pattern we found above for individual items, i.e., a meaningful increase in favorable perceptions and attitudes in 2013 followed by declines in 2014 and 2015, before another uptick in 2016.²² The “Well Designed Plan” and “Satisfaction” clusters follow this trend with one exception. Teachers did NOT show upticks in 2016; rather, they were slightly less positive every year. In every group except administrators respondents were less likely over time to see SC as a burden, taking time away from instruction. Principals and assistant principals took a slightly less favorable view of SC in this respect in 2015, suggesting that administering the program became more difficult in the last full year of operation, coinciding with efforts to secure other funding for the program.

²¹ Survey items were grouped based on factor analyses. See [Appendix IV2](#) for results of conducting factor analyses on the spring 2015 SC survey responses. Factor analyses were conducted on SC survey responses every year from 2013 through 2015 and yielded highly consistent factor structures. Each respondent’s “factor score” represents the mean response to items included in a factor.

²² Analysts were concerned that the uptick observed for several of the item clusters may have been due to the composition of the sample in 2016. To test for a composition bias, analysts calculated mean cluster scores for two groups of 2015 respondents – those who responded in 2015 only and those who responded in both years. The results showed that the mean responses in 2015 for repeat respondents were lower (less favorable) than the group that did not respond in 2016. This suggests that any improvements in perceptions and attitudes observed in 2016 are “real” and not just a result of hearing only from more satisfied personnel.

Figure 4.3. Perceptions and Attitudes by Position Type over Time

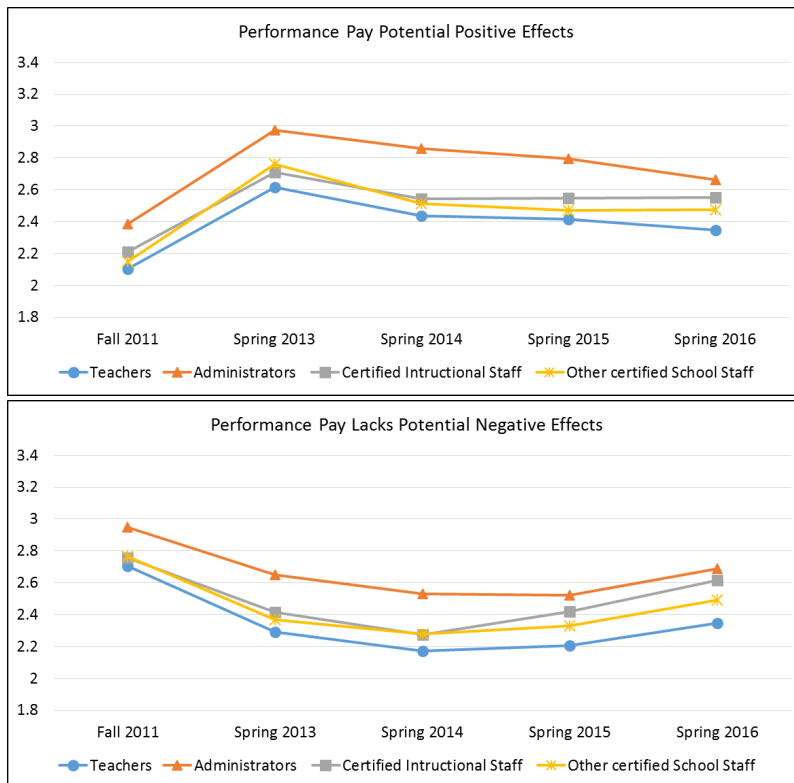


Trends in reported satisfaction with the SC plan showed a slight uptick for teachers in 2013 and then a general decline among both teachers and administrators over the following years. Respondents in other types of positions reported they were more satisfied with the program in 2016 than the prior year.

The groups of items in Figure 4.3 on perceived positive impacts and lack of negative impacts demonstrate the same up, then down, trajectory through 2015. All employee groups showed an increase in positive impacts and a decrease in negative impacts in 2016.

Figure 4.4 shows the trends in responses to items related to potential impacts of performance-based pay in schools. The items clustered into those associated with positive outcomes versus those associated with negative outcomes. (Negatively worded statements were reverse coded so a higher value was indicative of more favorable perceptions.) The first graph shows the familiar up, then down pattern, though with no uptick in the last year. From 2013 on, educators in all groups were increasingly less likely to think that performance pay would lead to positive effects in their schools.

Figure 4.4 Potential Impacts of SC Programs



The second graph in Figure 4.4 shows mean responses regarding the potential negative effects of performance-based pay for all employee groups who responded. It appears that concerns about potential negative effects of “competitive” performance-based pay increased in the first two years that SC programs operated but have waned over the last two years. This may reflect efforts by administrators to encourage collaboration and team work among staff to facilitate meeting performance criteria tied to bonuses and performance-contingent salary increases. Evidence supporting this hypothesis can be found in responses to an item on the 2015 SC survey that asked how much the SC program had affected collaboration.²³ On the eleven specific activities mentioned, the proportion of teachers responding that collaboration had decreased never exceeded 15%.

Expectations and Perceptions

As the preceding findings show, views of SC have varied over time and across categories of school employees. We now investigate the extent to which this variation reflects the way teachers and other educators have fared under SC.

3. How do perceptions and attitudes vary based on degree incentive pay expectations were met?

Responses from SC surveys administered in spring 2013 through 2016 were combined to investigate this research question. Teacher respondents were placed into one of four groups based on their responses to two questions. Those who participated in the SC program but indicated they received no bonus were placed into a “no bonus” group. Those who indicated they did receive an award then responded to questions about the amount they received and whether that amount was less than they expected, the amount they expected, or more than they expected. Answers to this latter question were used to sort teachers who received bonuses into three groups: bonus less than expected, bonus equal to expected, bonus more than expected.

Figure 4.5 depicts average responses by group to several clusters of survey items.²⁴ Teachers who received no bonus were the least likely to agree that the SC program was well designed

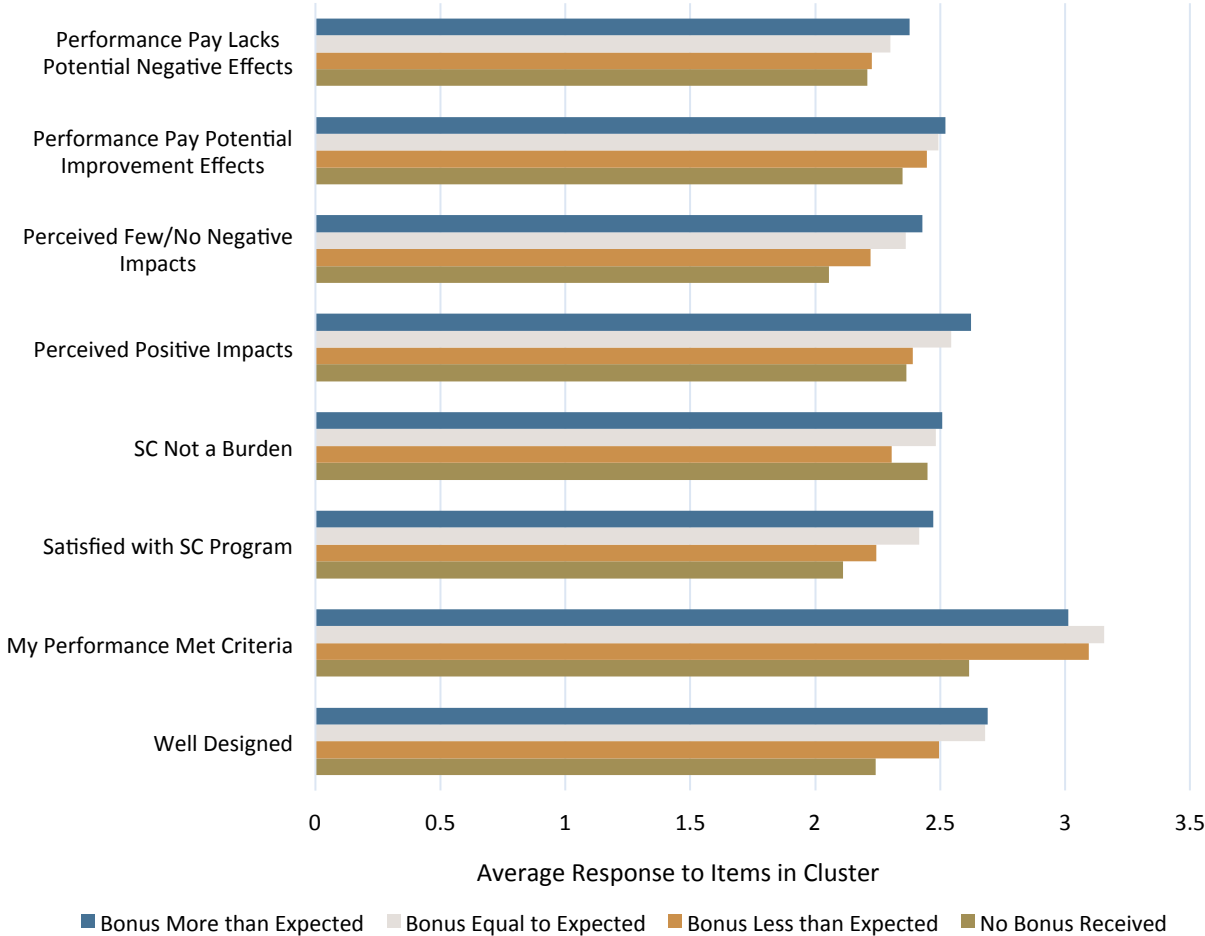
²³ The survey item is number 21 and a summary of responses for each of the collaboration activities can be reviewed in the 2015 SC survey frequency tables included with this report as [Appendix IV3](#).

²⁴ Survey items were grouped based on factor analyses. See Appendix IV2 for results of conducting factor analyses on the spring 2015 SC survey responses. Factor analyses were conducted on SC survey responses every year from 2013 through 2015 and yielded highly consistent factor structures. Each respondent’s “factor score” represents the mean response to items included in a factor.

and that they were satisfied with it. Teachers in this group were also less likely to agree that the SC program was having a positive effect on their schools. Similarly, teachers who received a bonus that met or exceeded their expectations expressed more positive opinions about the SC program and its effects than teachers whose bonus was less than they expected to receive. In short, opinions and perceptions of strategic compensation initiatives were more positive among teachers who were treated well by the system.

It also is interesting to note that the pattern of results for survey questions about perceived impacts of the SC programs in teachers’ schools and attitudes about potential impacts of performance pay, in general, are very consistent. It is unclear whether general attitudes informed perceptions of SC program impacts or if perceptions of local program impacts informed general attitudes.

Figure 4.5 Teachers’ Average Agreement with Statements About SC Programs for Teachers Who Did NOT Receive Bonuses and by Degree Bonus Payments Met Expectations



Results from a regression of average cluster scores on selected teacher characteristics are shown in Table 4.2. The coefficients in the Model 1 column show how receiving a bonus changed average cluster scores, controlling for other teacher characteristics. The coefficients in the Model 2 column show how meeting bonus expectations affected average cluster scores in comparison to teachers who did not receive a bonus, controlling for other teacher characteristics.²⁵ The standard deviation of cluster scores is given beneath the name of each cluster and affords a benchmark against which coefficients can be measured.

Turning first to Model 1, we see that teachers who received a bonus generally viewed their plan favorably. For example, the standard deviation of the “Well Designed” variable is .68. Teachers who received an award on average reported a .39 scale point more favorable rating than those who did not. Thus receipt of a bonus is associated with a rating that is a bit more than a half a standard deviation higher on the satisfaction measure. That is a fairly large effect. Looking across the question clusters, we see that teachers who received bonuses were generally more supportive of these plans in nearly all dimensions. The sole exception is that bonus recipients were a bit less likely to say the program was NOT a burden, but the relationship, while statistically significant, is very small in relation to the standard deviation (.05 versus .76).

Model 2 breaks up the received bonus group into three mutually exclusive subgroups: bonus less than expected, equal to expectations, and above expectations. We would expect that the coefficient on Bonus in Model 1 would be bracketed between the largest and smallest of the coefficients in Model 2, since everyone who received a bonus had to have a bonus that was less, equal or more than expected. That is exactly what we find. We also find that the “less than expected” respondents tended to view the bonus plans more skeptically than the “equal” or “exceeds” group. Typically the “exceeds” group had the most favorable impression of these plans.

The bottom line is that how teachers fared in the bonus plan is clearly associated with their perception of plan fairness and impact.

²⁵ Tables showing complete regression results for these models and groups of items are presented in [Appendix IV4](#).

Table 4.2 Summary Results from Regressing Perception and Attitude Measures on Whether or not Received a Bonus (Model 1) and Degree Expectations were Met (Model 2)

	Well Designed Std=.68		My Performance Met Criteria Std=.67		Satisfied with SC Program Std=.68		SC Not a Burden Std=.76	
	<u>Model 1</u>	<u>Model 2</u>	<u>Model 1</u>	<u>Model 2</u>	<u>Model 1</u>	<u>Model 2</u>	<u>Model 1</u>	<u>Model 2</u>
	Received Bonus	0.3901		0.5775		0.2859		0.0548
Bonus Less than Expected		0.24483		0.53506		0.14034		-0.09276
Bonus Equal to Expected		0.43544		0.60924		0.32231		0.09721
Bonus More than Expected		0.4394		0.47572		0.37032		0.10633

	Perceived Positive Impacts Std=.61		Perceived No / Few Negative Impacts Std=.81		Performance Pay Potential Positive Effects Std=.69		Performance Pay Lacks Potential Negative Effects Std=.76	
	<u>Model 1</u>	<u>Model 2</u>	<u>Model 1</u>	<u>Model 2</u>	<u>Model 1</u>	<u>Model 2</u>	<u>Model 1</u>	<u>Model 2</u>
	Received Bonus	0.1765		0.2938		0.1492		0.1163
Bonus Less than Expected		0.04118		0.16897		0.09966		0.0471
Bonus Equal to Expected		0.20827		0.3233		0.16045		0.12595
Bonus More than Expected		0.26946		0.37882		0.18504		0.2045

Coefficients shown in italics are NOT statistically significant at p < .05 level.

Attitudes about Evaluation and Perceptions of SC Program

The improvement initiatives pursued as part of Tennessee’s winning First to the Top (FTTT) grant application included making educator evaluations more systematic and rigorous. Results from educator evaluations are an important criterion for determining performance-based pay in nearly all of the SC plans reviewed for this report. The Consortium conducted annual surveys to assess perceptions and attitudes about FTTT initiatives that focused primarily on the evaluation initiative and invited all licensed personnel in public schools to respond to those surveys. In this section of the report, teachers’ responses about educator evaluations from the 2015 FTTT survey were linked to their responses to the spring 2015 SC survey to examine how perceptions and attitudes about evaluation systems were related to perceptions and attitudes about SC programs. The following research question is addressed in this section of the report.

4. How do perceptions and attitudes vary based on perceived fairness of employee evaluation processes?

Figure 4.6 presents a summary of responses to the item from the spring 2015 FTTT survey assessing perceptions of fairness of evaluation processes from educators in SC schools who also responded to the spring 2015 SC survey. Note first that while more than 60% of all respondents indicated that they perceived evaluation processes to be fair, there is significant variation in the perceived fairness across the districts with SC schools. Teachers were least likely to agree that processes were fair in Knox. At the other end of the spectrum, nearly 90% of responding teachers in Bradford agreed that the evaluation process was fair, with no one responding “strongly disagree.”

Figure 4.6 Agreement With FTTT Statement that “Evaluation processes are fair to me” for Individuals Who Also Completed the Spring 2015 SC Survey

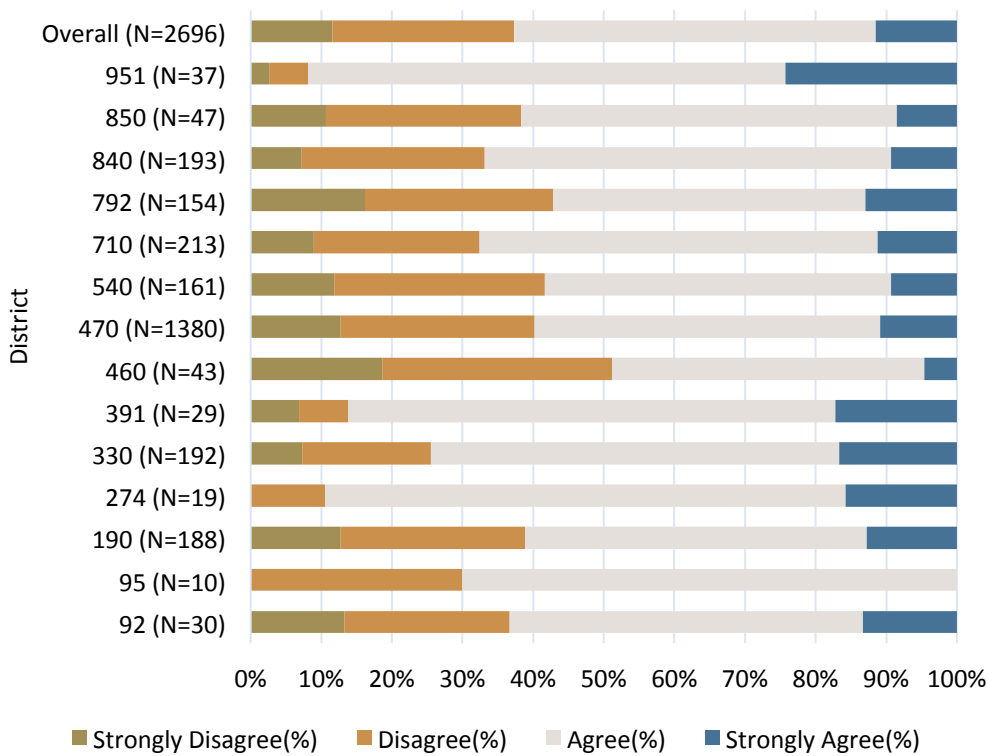
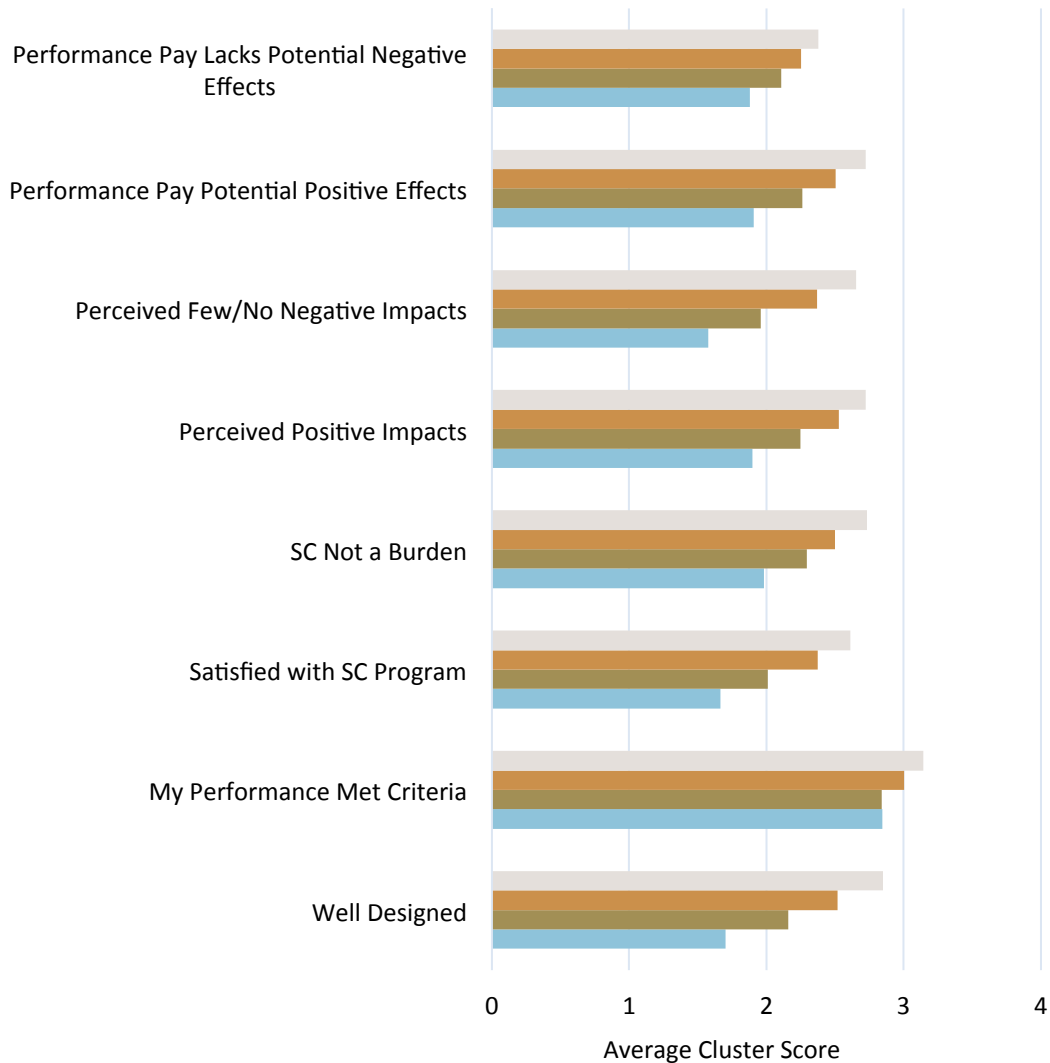


Figure 4.7 shows how perceptions of SC are related to teachers’ views of the evaluation system. Each bar shows the average response within various SC clusters by responses to the item: “Evaluation processes are fair to me.” There is a positive relationship between educators’ perceived fairness of evaluation processes and their perceptions of their SC programs. Those who strongly agreed that their evaluations were fair posted the most favorable perceptions of their SC programs, while those who strongly disagreed that their evaluations were fair posted the least favorable perceptions.

Figure 4.7 Educator Perceptions of SC Programs by Agreement with Statement that “Evaluation processes are fair to me”



Response to "Evaluation processes are fair to me"
 ■ Strongly Agreed ■ Agreed ■ Disagreed ■ Strongly Disagreed

Given that evaluation scores are the single most important factor determining the size of awards, it is not surprising that teachers who believe the evaluation process to be unfair also take a dim view of SC. An SC plan that puts a lot of weight on evaluation results may not motivate them to improve. It may be advisable to redesign SC to mitigate this tendency. Perhaps one strategy would be to include incentive pay for improvements in overall evaluation scores or in particular components of the observation rubric.

Characteristics of SC Plans and Teachers' Perceptions and Attitudes

Tennessee districts were given latitude to determine the performance measures used to determine performance-based pay and to set the criteria for various bonus awards or salary increments. This flexibility generated variation in the key parameters that define each district's SC program as noted in an earlier chapter. This section of the report investigates following research question.

5. How do perceptions and attitudes vary based on characteristics of performance pay plans?

Table 4.3 shows proportion of performance pay allocated for 11 categories of performance measures identified in SC plans and four units of accountability. Table 4.3 displays the proportion of dollars paid out in each category across the 3 years. Summative evaluation scores drove nearly 50% of all performance based payments. Individual performance was used to determine nearly three quarters of all performance-based payments.

**Table 4.3 How Performance-Based Pay for Teachers Was Allocated
Across Performance Measures and Units of Accountability**

Types of Criterion Measures	Proportion of \$\$
Growth (Test Scores)	0.210
Achievement Levels	0.045
Change in Achievement Levels	0.012
AYP Based	0.088
Summative Evaluation Score	0.478
Evaluation Observations	0.019
Professional Development	0.012
Position Based	0.027
Effort Based	0.096
Degrees Attained	0.003
Student Behavior (Graduations, Attendance, etc.)	0.011
Unit of Accountability	
Individual	0.747
Team	0.012
School	0.233
District	0.008

Using regression analysis, we have explored the relationship between teacher attitudes regarding their performance pay plan and plan characteristics.²⁶ The following two models were estimated for each of the eight perceptual and attitudinal cluster measures derived from survey items and responses.

$$A_i = \beta_1 X + \beta_2 \text{BONUS} + \beta_3 \text{TYPE} + \beta_4 \text{UNIT} \quad (1)$$

$$A_i = \beta_1 X + \beta_2 \text{BONUS} + \beta_3 \text{TYPE} + \beta_4 \text{UNIT} + \beta_5 \text{BONUS} * (\text{TYPE}, \text{UNIT}) \quad (2)$$

In all cases the A_i variable is a cluster score for a survey respondent in a given year. The first set of variables (TYPE) characterizes the district bonus plans by the proportion of dollars awarded in connection with the various performance measures in the year the survey was taken: growth in achievement, level of achievement, change in school level score, AYP, etc. The second set of variables (UNIT) measures the proportion of awards associated with the various units of accountability: individual teacher, team, school, and district. Each model controls for whether the teacher received a bonus (BONUS). Model (1) estimates the average effect of TYPE and

²⁶ [Appendix IV5](#) presents detailed results for these regressions.

UNIT across all participating teachers. Model (2) allows for a different effect of the TYPE and UNIT variables, depending on whether the teacher received a bonus or not.

Table 4.4 presents a summary of the regression results for the two models specified above. Only results for program design characteristics and whether or not a bonus was received are included in the table. The first half of the table shows results for the clusters related to program design and personal performance. The second half presents results for clusters related to effects of SC programs and potential effects of differentiated pay. Bonus recipients on average viewed their plans more favorably, even after controlling for plan characteristics. In general, there were few significant relationships between the types of bonus plans and teacher attitudes. Plans that increased payments for the level of performance relative to growth tended to be more favorably viewed. There was also a tendency for plans that loaded relatively more pay toward summative measures from education evaluation (and away from growth measures) to be viewed less favorably. There is some evidence that plans awarding a larger share of dollars for district level (as compared to individual) measures were viewed less favorably. We caution against making too much of these limited findings, for two reasons: first, the estimated effects are generally quite small; second, given the large number of relationships examined, it is virtually assured that some will appear to be statistically significant merely by chance.

Table 4.4 Summary Regression Results: Perceptions and Attitudes Regressed on Plan Characteristics

	Well Designed Std=.68		My Performance Met Criteria Std=.67		Satisfied with SC Program Std=.60		SC Not a Burden Std=.80	
	Estimate	Sig	Estimate	Sig	Estimate	Sig	Estimate	Sig
Growth (Test Scores) (Omitted)	--	--	--	--	--	--	--	--
Achievement Levels	0.006925		0.002602	***	0.004869		0.001216	
Change in Achievement Levels	-0.00395		0.008126		-0.01179		-0.01242	
AYP Based	-0.00414		0.004185		-0.01335	***	-0.02174	
Summative Evaluation Score	-0.00362		-0.00202		-0.00301		-0.00543	***
Evaluation Observations	-0.0038		-0.00364	*	-0.0063		-0.01101	
Professional Development	0.000597		-0.00602		0.004819		0.0006	
Position Based	-0.00849		-0.01027		-0.00896		-0.01975	
Effort Based	-0.00101		0.004979		-0.00089		0.002349	
Degrees Attained	-0.03337		-0.06387		-0.05184		0.188528	*
Student Behavior (Graduations, Attendance, etc.)	-0.01594		-0.01655		-0.01928		-0.00741	
Individual Performance (Omitted)	--	--	--	--	--	--	--	--
Team Performance	-0.00074		0.012738		0.003265		-0.0134	
School Performance	-0.00201		0.000579		-0.00259		-0.00092	
District Performance	0.013172		0.018192		0.012694		-0.08088	*
Received Bonus 1/0	0.48	**	0.96	***	0.60	***	0.11	

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.4 Summary Regression Results: Perceptions and Attitudes Regressed on Plan Characteristics (Continued)

	Perceived Positive Impacts Std=.69		Perceived Few/No Negative Impacts Std=.61		Performance Pay Potential Positive Effects Std=.68		Performance Pay Lacks Potential Negative Effects Std=.77	
	Estimate	Sig	Estimate	Sig	Estimate	Sig	Estimate	Sig
Growth (Test Scores) (Omitted)	--	--	--	--	--	--	--	--
Achievement Levels	0.002353		0.004484		0.006604		0.006827	
Change in Achievement Levels	-0.02142		-0.01281		-0.00658		-0.01108	
AYP Based	-0.01104		-0.00387	*	-0.00082	*	-0.00697	
Summative Evaluation Score	-0.00286	*	-0.00435		-0.00201		0.001868	
Evaluation Observations	-0.01091		-0.00584		-0.00302		-0.0035	
Professional Development	0.011573		0.001088		0.008458		0.009976	
Position Based	-0.00271		-0.00151		0.001474		-0.00249	
Effort Based	-0.00436		-0.00604		-0.00702		0.000413	
Degrees Attained	0.129148		-0.07293		-0.13331		0.084146	
Student Behavior (Graduations, Attendance, etc.)	-0.0058		-0.01703		-0.00732		0.010847	
Individual Performance (Omitted)	--	--	--	--	--	--	--	--
Team Performance	-0.01802		0.007185		0.015163		-0.01528	
School Performance	-0.00108		-0.00304		-0.0069		-0.00024	**
District Performance	-0.04447		0.023118		0.04907		-0.02393	
Received Bonus 1/0	0.30		0.73	***	0.29		-0.54	**

* $p < .05$, ** $p < .01$, *** $p < .001$

Summary of Findings and Discussion

Performance-based pay represents a major change that directly impacts teachers, building administrators, and others who work in schools. The degree to which such a change leads to improved schooling outcomes may well depend on whether teachers perceive that differentiated pay is beneficial for their own well-being and for students' success.

Earlier reports on the SC survey were organized by the content and structure of the surveys and presented relatively detailed results for specific items. This final report on survey results focuses on integrating findings across time and examining relationships that might explain variation in perceptions and attitudes. The analyses were guided by the research questions posed at the beginning of the chapter. This summary identifies and discusses key findings related to those research questions.

Perceptions of SC Programs by Position and How They Have Changed Over Time

Overall, the results from the two SC surveys administered in spring 2015 and 2016 are fairly consistent with results from earlier administrations. Generally, school leaders held the most favorable views of SC and its effects, with mean ratings for clusters of related items generally between 2.5 and above 3.0 (showing agreement with positive statements). Teachers held the most critical view, with mean ratings generally between 2.0 and 2.5, indicating that they were split between those who disagreed and those who agreed with positive statements about SC.

Beliefs about SC programs and their effects were the least favorable in the first year measured, improved substantially in the second year of operation, became slightly more critical in each of the next two years, and then showed a slight rebound in 2016. Patterns are relatively consistent across employee groups, though teachers were less likely to show improved perceptions and attitudes in 2016. One interesting finding is that perceived or potential negative effects (unintended consequences) attributed to SC programs actually declined over the last two years.

Given that, at best, only half of teachers expressed favorable perceptions and attitudes about the SC programs in their schools, it is interesting to note that about two of every three teachers indicated they wanted the bonus and/or alternative salary programs in their schools to continue.

Explaining the Variation in Perceptions and Attitudes

The most important variable associated with teachers' perceptions and attitudes is whether or not they received performance based pay from the SC program in their school, and for those who did receive performance-based pay, whether the amount they received was equal to or more than they expected to receive. This is true even after controlling for teacher characteristics (e.g., experience) and the types of schools in which they worked.

Shifting views of SC over time basically parallel changing attitudes toward teacher evaluations. Figure 4.7 shows that perceptions of the fairness of evaluation processes were directly related to perceptions and attitudes about SC programs. Teachers who indicated that they perceived their evaluations to be fair were more favorably disposed toward the SC programs in their schools. This is unsurprising, given that nearly all the SC plans in districts participating in the SC initiative included results from educator evaluations as an important criterion for determining bonuses and/or alternative salary increments.

SC plans differed considerably with respect to the type of performance measures and the weight given to each in determining an award. However, after controlling for teacher characteristics and whether or not respondents received performance pay, variation in how award amounts are determined was not a strong predictor of perceptions and attitudes.

These results, taken together, suggest that teachers are most likely to take a favorable view of plans that offer many of them an opportunity to earn an award. The finding that favorable attitudes were less likely among teachers whose expectations were not met suggests that simple, transparent plans are desirable.

Chapter 5: Turnover Analysis

This chapter presents findings from an analysis of teacher retention and turnover. The analysis uses administrative records from PIRS and EIS that were extensively audited and cleaned by the evaluators. Additional data used in the analysis come from the U.S. Department of Housing and Urban Development (HUD), the National Center for Education Statistics (NCES) and the Bureau of Labor Statistics (BLS).²⁷

Who was analyzed?

This analysis focused exclusively on classroom teachers. Classroom teachers are individuals who were identified as holding a classroom teaching assignment in either the PIRS or the EIS files and who worked at least half time. The category includes all individuals with a classroom teaching assignment, regardless of their other duties.

What was analyzed?

Evaluators examined the relationship between characteristics of the strategic compensation program and teacher retention, paying particular attention to differences in retention between bonus-only districts and alternative salary schedule districts.

When?

The analysis covers the nine-year period from 2005-06 through 2013-14.²⁸ The final three years of the analysis period (2011-12, 2012-13 and 2013-14) correspond to the period during which the first three rounds of performance payouts were earned.

²⁷ See [Appendix V](#) for details.

²⁸ Note that data from 2014-15 were used to determine the retention rates for the 2013-14 school year.

Where?

The analysis includes classroom teachers from all Tennessee public school districts with enrollments of 10 or more students except the Achievement School District; the Tennessee School for the Deaf; the West Tennessee School for the Deaf; the Tennessee School for the Blind; and the Alvin C. York Institute. Six newly established districts—Arlington, Bartlett, Collierville, Germantown, Lakeland and Millington—were not included in the analysis because they were not operational during the analysis period.

Why focus on turnover?

Researchers have identified two mechanisms through which strategic compensation programs could have a positive impact on public school systems. First, the programs could change the behavior of existing teachers by inducing them to adopt more effective classroom strategies. Second, the programs could change the composition of the teacher corps by drawing higher ability individuals into teaching and encouraging lower ability individuals to find other careers.

Retention and turnover are necessary elements of the second mechanism. If the strategic compensation programs are going to affect the composition of teachers in Tennessee, then they must affect the mix of teachers hired and retained. Therefore, understanding the impact of the strategic compensation programs on teacher retention is essential.

Table 5.1: Non-Programmatic Explanatory Variables Included in the Analyses of Teacher Turnover

Teacher Characteristics
Full-time-equivalent salary
Sex
Race/ethnicity
Educational attainment
Years of experience
Age
Eligibility for service retirement
License endorsements in:
Mathematics
English
Science
History
Physical Education
World Languages
Campus administrator
Elementary arts teacher
Special education teacher
EIS elementary level teacher
EIS middle school teacher
EIS high school teacher
New to the school indicator
TVAAS Index Scores
District Characteristics
Percent low income students
Percent LEP students
Percent special education students
District size
Local Labor Market Conditions
Prevailing wage for college graduates (CWI)
County unemployment rate
County cost of living (fair market rent)
Other characteristics
School year indicators

How was the analysis conducted?

To separate the impact of the strategic compensation programs from other factors affecting teacher retention (such as changing labor market conditions) requires economic modeling and regression analysis. Following the literature and prior analyses of turnover in Tennessee, the evaluators modeled turnover as depending on the characteristics of a teacher's current job, his or her employment alternatives, and any personal characteristics that might influence the turnover decision.²⁹ Table 5.1 illustrates the teacher, district and labor market characteristics included in the turnover models. The impact of strategic compensation on teacher retention was analyzed holding constant all of the other explanatory factors in Table 5.1

Key findings

- There is no evidence that the strategic compensation program increased teacher retention in bonus-only schools. Instead, the evidence suggests that retention rates in bonus-only schools fell significantly after each round of the strategic compensation program.
 - Retention rates fell more than expected because the probability of leaving the public school system increased for bonus-only schools after all three rounds.
 - The probability of moving to another Tennessee district also increased, but the change was only statistically significant after Round 2.
 - There is some evidence that the increase in turnover among bonus-only schools was concentrated among teachers with relatively low TVAAS scores.
- In contrast, overall teacher retention increased after Rounds 2 and 3 for alternative salary schedule schools (although the difference after Round 3 is imprecisely measured and not statistically significant).
 - Retention rates rose because fewer teachers than expected left the public school system.
- The strategic compensation program appears to have maintained the negative relationship between TVAAS scores and turnover during a period when that relationship was weakening elsewhere in the state.

²⁹In addition to the observable characteristics in Table 5.1, there are undoubtedly other characteristics—such as a change in marital status, the birth of a baby, a spousal relocation or a serious illness—that could also explain an individual teacher's retention decision. Unfortunately, data on those other characteristics are not available.

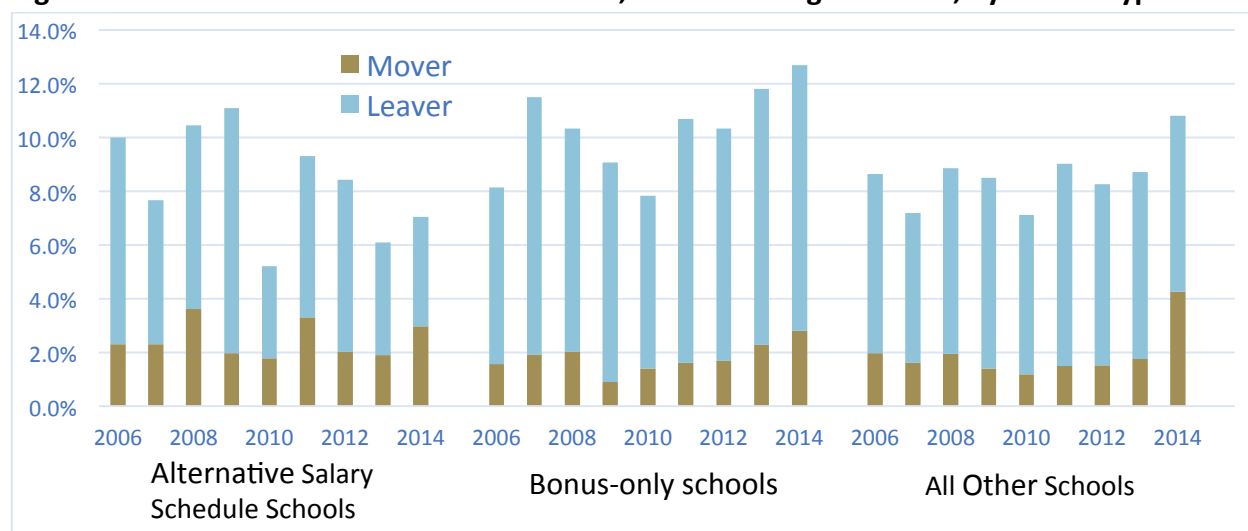
- All other things being equal, teachers who did not receive a payout had an elevated probability of turnover, while the probability of turnover among teachers who received a substantial award was very small.
- Salary incentives had a larger, positive impact on the retention of individual teachers than did one-time bonus payouts. A one-time bonus of \$1,000 had the same estimated impact on teacher turnover as a salary incentive of roughly \$350. There are two likely explanations for this pattern.
 - First, salary incentives are designed to be permanent so a teacher who receives a \$1,000 salary incentive can reasonably expect to receive that \$1,000 each year for the rest of her career—provided that she does not leave the district. As a result, the (present discounted) value of a salary incentive is higher than its face value.
 - Second, while a teacher might be able to receive a one-time bonus despite quitting, she has no way to benefit from a salary incentive except by returning to the district where she earned the award.

The Overall Picture Of Teacher Retention

Throughout this analysis, classroom teachers were considered retained if they were employed by the same district in the subsequent academic year. Thus the retention rate for 2012-13 was the fraction of teachers who were employed by a district during 2012-13 and were still employed by the same district in 2013-14. Teachers who were promoted were considered retained. Teachers who moved from one school to another within the same district were also considered retained.

All teachers who were not retained turned over. Teachers who turned over were further classified into those who changed districts (Movers) and those who were no longer employed by a Tennessee public school (Leavers). Teachers who left the public school system for at least a year were considered leavers, even if they returned to the system at some later date. In a typical year, 91% of Tennessee classroom teachers are retained, 2% move to another school district, and 7% leave the public school system.

Figure 5.1: Classroom Teacher Turnover Rates, 2005-6 through 2013-14, by School Type



Source: EIS and PIRS.

Figure 5.1 illustrates the annual teacher turnover rates for bonus-only schools, alternative salary schedule schools, and the remaining public schools in Tennessee before and after implementation of the strategic compensation program (which occurred in 2011-12, denoted 2012 in the figure). As the figure illustrates, prior to the implementation of the strategic compensation program there were systematic differences among the three types of schools. On average, alternative salary schedule schools had higher mover rates and lower leaver rates than the other two types of schools, while bonus-only schools had higher leaver rates than other types of schools, but similar mover rates.

After the first year of the strategic compensation program (2011-12) teacher turnover rates were lower than they had been the year before for both types of strategic compensation program schools. However, they were also lower for schools that did not participate in the program, so it is unlikely that the decline in turnover at program schools is fully attributable to the strategic compensation program.

After the second year of the strategic compensation program (2012-13) turnover rates were higher than they had been the year before in bonus-only schools, but also in schools that did not participate in the strategic compensation program. Again, it is hard to interpret the increase as program-related. On the other hand, turnover rates after the 2012-13 school year were lower than the year before in alternative salary schedule schools, a break in pattern that could prove meaningful.

The third year of program implementation saw turnover rates increase for all three types of schools, but especially schools that were not participating in the strategic compensation program. Mover rates rose sharply, which may be related to the movement of teachers to staff six new school districts in Shelby County.

What Is The Overall Impact Of The Strategic Compensation Programs On Retention?

Clearly, the strategic compensation programs are not the only factors changing in Tennessee. Changes in the demographic characteristics of the teaching staff or changes in local labor market conditions offer alternative explanations for the observed changes in turnover patterns. Therefore, the evaluators used regression analysis to disentangle the impact of the strategic compensation programs from the other factors influencing teacher retention in Tennessee. For details of that analysis, see [Appendix V](#).

Table 5.2: Changes in the Probability of Turnover at the End of Each of the First Three Years of the Strategic Compensation Program by Strategic Compensation Type, All Classroom Teachers

	Retained	Mover	Leaver
Bonus Only schools			
Probability Round 1	90.5%	1.9%	7.5%
Change from expected probability	-1.2%**	0.2%	1.0%**
Probability Round 2	89.6%	2.6%	7.7%
Change from expected probability	-1.7%***	0.6%***	1.1%**
Probability Round 3	88.1%	3.4%	8.5%
Change from expected probability	-0.8%*	-1.3%	2.2%***
Alternative Salary Schedule Schools			
Probability Round 1	90.9%	1.7%	7.4%
Change from expected probability	-0.8%	-0.3%	1.2%
Probability Round 2	93.5%	1.6%	4.9%
Change from expected probability	2.2%***	-0.7%	-1.4%*
Probability Round 3	90.8%	5.0%	4.2%
Change from expected probability	2.2%	-0.4%	-1.8%*

Source: Author's calculations from the multinomial logit analysis in [Appendix table V.2a](#). Rows may not add due to rounding. Asterisks indicate changes that are statistically significant at the 1 percent (***), 5 percent (**), and 10 percent (*) levels. Statistical significance for the retention rate based on the logit analysis in [Appendix table V.3a](#).

Table 5.2 illustrates the impact of the strategic compensation programs on teacher turnover rates. The first column indicates the overall impact of each type of strategic compensation program on the share of teachers who are retained. As the table illustrates, the probability that a teacher in a bonus-only school would be retained at the end of the 2011-12 school year (i.e., return to work in the district in the fall of 2012) was 90.5%, which was significantly lower than one would have expected in the absence of the program. The probability that a teacher in bonus-only schools would be retained at the end of the 2012-13 school year was 89.6%, a statistically significant 1.7 percentage points lower than the 91.3% rate that would have otherwise been expected. The probability that a teacher in a bonus-only school was retained after round 3 was 88.1%, which again was significantly higher than what would have otherwise been expected for 2014 (at the 10-percent level).

The probability that a teacher would be retained in alternative salary schedule schools fell after Round 1, but rose 2.2 percentage points after Years 2 and 3. Only the increase in retention after Round 2 was statistically significant.

The remaining two columns of Table 5.2 distinguish between Movers and Leavers. As the table illustrates, only the second round of the strategic compensation program had a statistically significant impact on a teacher's likelihood of moving from a bonus-only school to another district. At the end of that round, the probability of moving from a bonus-only school to a school in another district was 0.6 percentage points higher than one would have otherwise expected. There was no evidence of a significant change in the probability of moving between districts for alternative salary schedule schools.

Bonus-only schools experienced a statistically significant increase in the probability of teachers leaving the Tennessee public school system in all three program years. After Year 3, the probability of leaving a bonus-only school was 8.5%, or 2.2 percentage points higher than would have been predicted for 2014-15. In contrast, after Rounds 2 and 3 the probability of leaving the Tennessee public school system was significantly lower than expected in schools with alternative salary schedules.

Are There Differences Among Teachers With Different Experience Profiles

Teacher turnover rates vary significantly by teacher experience in Tennessee. The average turnover rate for beginning teachers is 13.3 percent, whereas the average turnover rate for

experienced teachers is only 5.5 percent.³⁰ Beginning teachers are also more than twice as likely to move between districts as are more experienced teachers. Given these differences, it seems reasonable to investigate whether or not the strategic compensation program had differential effects depending on teacher experience.

Beginning teachers

Table 5.3 examines the impact of the strategic compensation programs on teacher turnover among beginning teachers. As the table illustrates, retention at the end of the 2011-12 school year was lower than predicted in both bonus and alternative salary schedule schools, but the difference was only statistically significant for bonus-only schools. Among beginning teachers in schools with an alternative salary schedule, a statistically significant increase in the probability of leaving the public school system was partially offset by a statistically insignificant decrease in the probability of moving between districts.

Table 5.3: Changes in the Probability of Turnover at the End of the First and Second Years of the Strategic Compensation Program by Strategic Compensation Type, Beginning Classroom Teachers

	Retained	Mover	Leaver
Bonus Only schools			
Probability Round 1	86.5%	3.5%	10.1%
Change from expected probability	-1.7%*	-0.1%	1.8%**
Probability Round 2	84.2%	6.3%	9.5%
Change from expected probability	-2.3%*	2.0%***	0.3%
Probability Round 3	82.9%	5.1%	12.0%
Change from expected probability	-3.1%***	-0.9%	4.0%***
Alternative Salary Schedule Schools			
Probability Round 1	81.9%	2.5%	15.6%
Change from expected probability	-5.3%	-1.8%	7.1%***
Probability Round 2	90.4%	2.8%	6.9%
Change from expected probability	5.1%**	-2.5%	-2.6%
Probability Round 3	89.3%	4.4%	6.3%
Change from expected probability	4.7%	-2.9%	-1.8%

Source: Author's calculations from [Appendix table V.2a](#). The probabilities come from a multinomial logit analysis. Rows may not add due to rounding. Asterisks indicate changes that are statistically significant at the 1 percent (***), 5 percent (**), and 10 percent (*) levels.

In Round 2, retention of beginning teachers was significantly higher than expected for alternative salary schedule schools, and significantly lower than expected for bonus-only schools. The percentage of beginning teachers moving and leaving after Round 2 was lower

³⁰ Beginning teachers are teachers with fewer than five years of experience. Beginning teachers are not vested in the Tennessee Consolidated Retirement System (<http://www.treasury.state.tn.us/tcrs/>)

than expected for alternative salary schedule schools, but the difference was only statistically significant in the aggregate.

In Round 3, retention of beginning teachers was significantly lower than expected in bonus-only schools. The 3.1 percentage point drop in the retention rate for bonus-only schools arose because there was a 4 percentage point increase in the fraction of beginning teachers who left the public school system.

Among alternative salary schedule schools, the pattern of retention for beginning teachers changed dramatically between the first and second years of the strategic compensation program. The probability that a teacher in an alternative salary schedule school would leave the public school system spiked after Round 1, but not after the subsequent rounds. However, these results should be interpreted with caution; the analysis is based on a very small number of individuals in alternative salary schedule schools (roughly 200 beginning teachers each year), so the statistically significant improvements represent the retention of no more than a dozen teachers who would otherwise have been expected to turn over.

Experienced teachers

Table 5.4 examines the impact of the strategic compensation programs on teacher turnover among experienced teachers who were not eligible for a service retirement.³¹ As the table illustrates, retention at the first two program years was significantly lower than predicted in bonus-only schools but not in alternative salary schedule schools. Retention was lower because the probability of leaving the public school system was significantly higher than expected in all three years for experienced teachers in bonus-only schools. None of the other differences were statistically significant.

³¹ To be eligible for a service retirement (i.e. a standard retirement) a teacher must have 30 years of experience, or be age 60 with at least 5 years of experience.

Table 5.4: Changes in the Probability of Turnover at the End of the First and Second Year of the Strategic Compensation Program by Type, Experienced Classroom Teachers

	Retained	Mover	Leaver
Bonus Only schools			
Probability Round 1	93.6%	1.7%	4.7%
Change from expected probability	-1.2%***	0.4%	0.8%**
Probability Round 2	94.0%	1.4%	4.7%
Change from expected probability	-0.8%*	0.1%	0.7%**
Probability Round 3	92.2%	3.1%	4.7%
Change from expected probability	0.4%	-1.4%	0.9%**
Alternative Salary Schedule Schools			
Probability Round 1	94.2%	1.7%	4.0%
Change from expected probability	-0.8%	0.4%	0.4%
Probability Round 2	95.8%	1.4%	2.8%
Change from expected probability	0.9%	0.0%	-0.9%
Probability Round 3	91.3%	6.2%	2.4%
Change from expected probability	-0.4%	1.4%	-1.1%

Source: Author's calculations from [Appendix table V.2a](#). The probabilities come from a multinomial logit analysis. Rows may not add due to rounding. Asterisks indicate changes that are statistically significant at the 1 percent (***), 5 percent (**), and 10 percent (*) levels.

Retirement-eligible teachers

Table 5.5 examines the impact of the strategic compensation programs on turnover among teachers who were eligible for a service retirement. Because there are so few retirement-eligible teachers who move between districts, it is not possible to estimate the impact of the strategic compensation programs on moving between districts. However, it is possible to detect an influence of the strategic compensation program on retention rates and leaver rates for this population. As the table illustrates, the strategic compensation program had a significant impact on this population as well. Most of the impact was among bonus-only schools. Retention rates dropped sharply for bonus-only schools after Rounds 2 and 3.

Table 5.5: Changes in the Probability of Turnover at the End of the First and Second Rounds of the Strategic Compensation Program, by Strategic Compensation Type, Retirement-Eligible Classroom Teachers

	Retained	Mover	Leaver
Bonus Only schools			
Probability Round 1	82.4%	n/a	17.4%
Change from expected probability	1.3%	n/a	-1.1%
Probability Round 2	75.4%	n/a	24.3%
Change from expected probability	-6.5%***	n/a	6.7%***
Probability Round 3	74.3%	n/a	23.7%
Change from expected probability	-3.8%**	n/a	4.7%**
Alternative Salary Schedule Schools			
Probability Round 1	90.9%	n/a	9.1%
Change from expected probability	6.6%*	n/a	-6.4%*
Probability Round 2	88.0%	n/a	12.0%
Change from expected probability	2.9%	n/a	-2.7%
Probability Round 3	89.5%	n/a	10.4%
Change from expected probability	7.3%	n/a	-5.6%

Source: Author's calculations from [Appendix table V.2a and V.3a](#). The probabilities come from two logit analyses—one for retention and another for leaving the public school system. There are too few retirement-eligible teachers moving among districts to estimate a reliable multinomial model of both moving and leaving. Asterisks indicate changes that are statistically significant at the 1percent (***), 5 percent (**), and 10 percent (*) levels.

There is some evidence that both years of the strategic compensation program increased retention among potential retirees in alternative salary schedule schools, but the estimates are measured with such imprecision that they are not statistically significant in Rounds 2 or 3.

All told, there is no evidence that the strategic compensation programs reduced turnover in bonus-only schools. Retention rates for all three types of teachers—beginning, experienced and retirement-eligible—were never significantly higher than would have been expected in the absence of the program and were significantly lower than would have been expected after one or more program rounds. This pattern was largely attributable to an increase in departures from the public school system.

The story is more nuanced for schools with alternative salary schedules. The small number of districts and schools with alternative salary schedules leads to relatively imprecise estimates of program effects. As a result, analysis cannot detect a statistically significant impact of the strategic compensation programs on the retention rates for experienced teachers. Beginning teachers left the public school system at an unusually high rate after Round 1, but that effect appears to have been temporary. Among beginning teachers in alternative salary schedule schools, turnover was significantly lower and retention significantly higher than expected after Round 2.

Thus, retention is higher than expected among some teacher subgroups, and lower than expected among others. Which raises a deeper question: who is moving? Are the strategic compensation programs leading to the departure of relatively ineffective teachers, or are the most effective teachers most likely to move?

Are There Differences Among Teachers With Different TVAAS Scores?

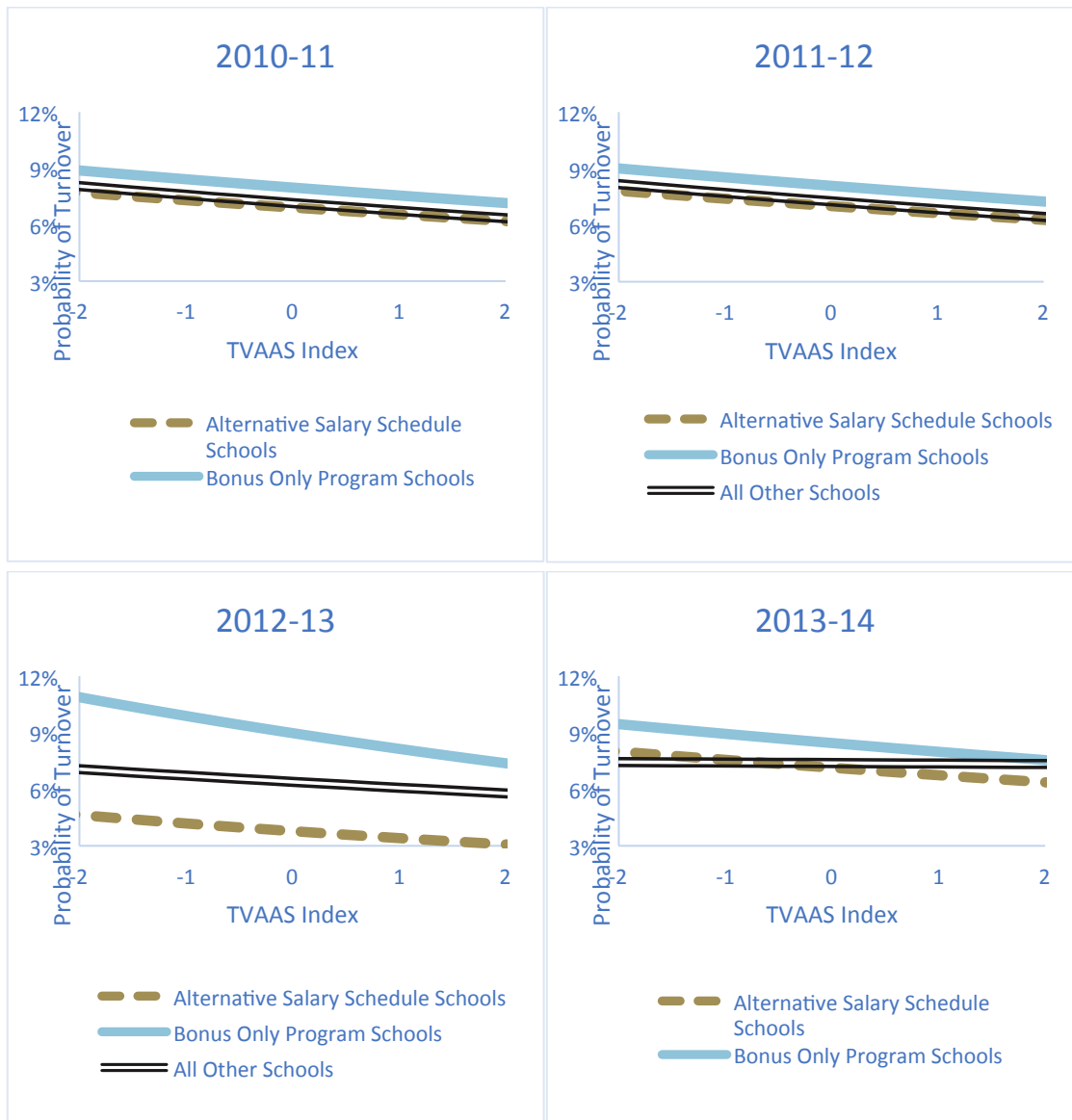
One way of measuring teacher effectiveness is through their Tennessee Value-Added Assessment System (TVAAS) scores. Although TVAAS scores are incomplete measures of teacher effectiveness, they are generally accepted as broadly indicative of teacher quality. For teachers in tested grades and subjects, TVAAS scores count for 35 percent of their teacher evaluation ratings.³² Therefore, researchers added information about the TVAAS Index scores for individual teachers to their models of teacher turnover. Due to data availability, this part of the analysis covers only five school years (2009-10 through 2013-14).

Figure 5.2 illustrates the relationship between TVAAS index values and the probability of turnover for the last year prior to implementation (2010-11) and each year of the strategic compensation program. In all cases, the probabilities have been adjusted to hold constant all of the other determinants of turnover in Table 5.1.³³ As the figures illustrate, in 2010-11 and 2011-12, the teachers with the lowest turnover rates were the teachers with the highest TVAAS index values. This pattern held for bonus-only schools, alternative salary schedule schools, and schools that did not participate in the strategic compensation program.

³² For more on the role of TVAAS scores in teacher evaluations, visit <https://www.tn.gov/education/topic/teacher-evaluation>.

³³ Some teachers have more than one TVAAS Index value because they teach multiple tested subjects or grades. The highest index value for each individual was used in the analysis. Individuals who taught multiple subjects in multiple districts were assigned their highest value for each district. TVAAS index values are treated as exogenous in this analysis. Researchers explored and statistically rejected the hypothesis that TVAAS index values were endogenous. [See Appendix V.](#)

Figure 5.2: The Relationship between TVAAS Index Values and Teacher Turnover in 2010-11 and 2013-14, by School Type



Source: Author's calculations. See [Appendix Table V.4](#).

However, in 2012-13 and especially in 2013-14, things changed. The slope of the curves became much flatter for schools that did not participate in the strategic compensation program, while there continued to be a significant difference in turnover rates between low-scoring and high-scoring teachers in strategic compensation schools. In other words, the strategic compensation program appears to have maintained the negative relationship between TVAAS scores and turnover during a period when that relationship was weakening elsewhere in the state.

There is also some evidence that the increase in turnover among Bonus-Only schools was concentrated among teachers with relatively low TVAAS scores. Holding all other characteristics constant at the mean, the probability of turnover among teachers with a TVAAS score of 2 was 7.1% in the year immediately prior to the implementation of the strategic compensation program and no higher than 7.7% during the first three years of the program. In contrast, the probability of turnover among teachers with a TVAAS score of -2 was 8.9% before implementation, and reached 10.9% during the second year of the program.

Are There Differences Among Teachers Based On The Size Of The Awards Received?

While it is clear that the strategic compensation programs did not increase retention in general, they may have increased retention among the teachers that school districts are most eager to retain. This section examines the link between the performance-based payouts under the strategic compensation programs and the probability that a teacher is retained. The analysis incorporates not only information on TVAAS scores, but also information on the actual dollar value of the performance-based payouts received by individual teachers. Data on the individual payouts earned in 2011-12, 2012-13 and 2013-14 are available for all 14 school districts that participated in the strategic compensation program.³⁴

As discussed in Chapter 3, the most common payout amounts each year were \$1,500 or \$2,000. Furthermore, all three alternative salary schedule districts paid one-time bonuses as well as salary incentives. For example, bonuses comprised 87 percent of the total amount of Round 2 payouts in Trousdale County, 67 percent of the total in Putnam County and 34 percent of the total payout amount in Lexington City.

The relationship between teacher turnover and incentive payouts is unlikely to be the same for both one-time bonuses and salary incentives. Salary incentives are designed to be permanent, so a teacher who receives a \$1,000 salary incentive can reasonably expect to receive that \$1,000 each year for the rest of her career—provided that she does not leave the district. As a result, the (present discounted) value of a salary incentive is higher than its face value, and higher for a teacher at the start of her career than it is for a teacher nearing retirement. Importantly, while a teacher might be able to receive a one-time bonus despite quitting, she has no way to benefit from a salary incentive except by returning to the district wherein she

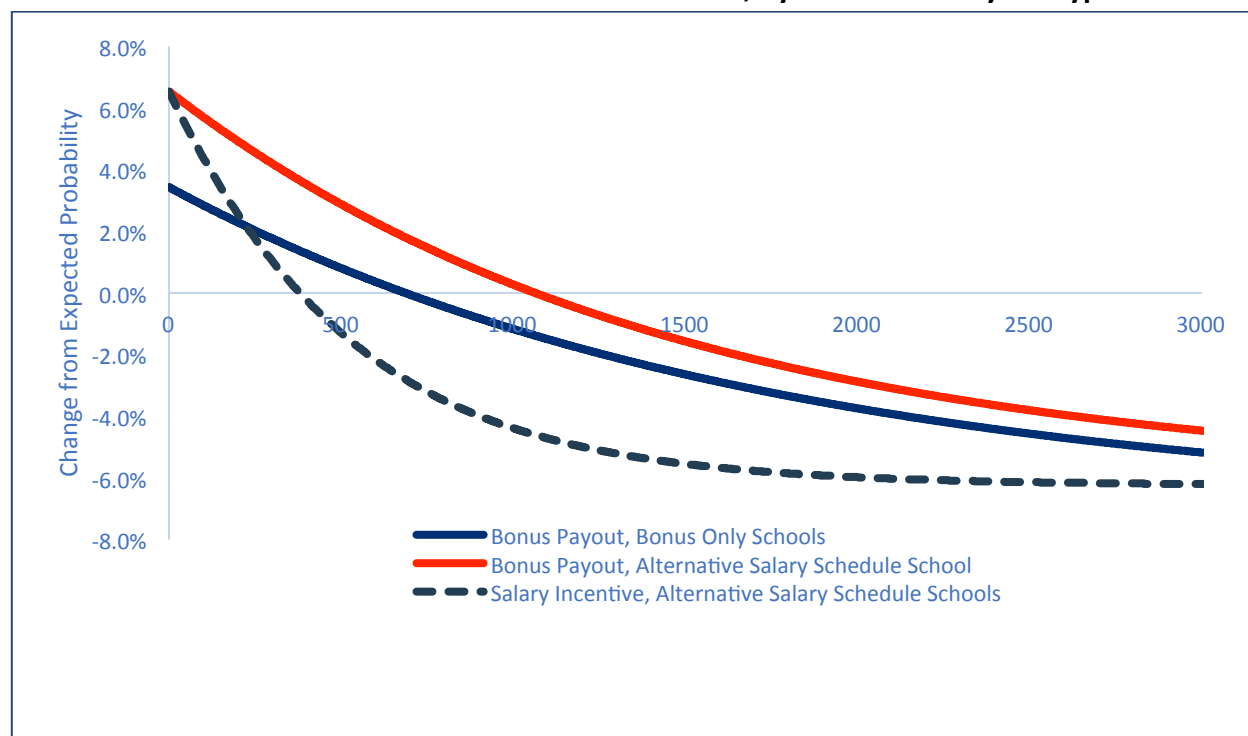
³⁴The payment amounts were merged to the administrative data files using teacher license numbers and district identifiers.

earned the incentive. Therefore, all analyses incorporating individual awards were evaluated assuming that salary incentives and one-time bonuses have different impacts on turnover.³⁵

Figure 5.3 illustrates the estimated relationship between Round 3 performance-based payouts and the probability of teacher turnover, after adjustment for TVAAS scores and all the other determinants of turnover presented in Table 5.1. (The patterns for Round 1 and 2 payouts were highly similar.) As the figure illustrates, there was a negative and statistically significant relationship between teacher turnover and the size of the individual payouts, regardless of the type of payout. Teachers who did not receive a payout had an elevated probability of turnover, while the probability of turnover among teachers who received a substantial salary incentive was vanishingly small. The probability of turnover by a teacher who received a bonus payout of \$1,500 was 1.6 percentage point lower than would have been expected in the absence of the program in bonus-only schools, and 2.6 percentage points lower than would have been expected in alternative salary schedule school. In both types of schools, the probability of turnover among teachers who received an award of at least \$1,000 was less than half of the expected probability of turnover among teachers who received no award.

³⁵ There was also a concern that some districts may have designed their strategic compensation programs to function as “golden handcuffs” and made payouts contingent on retention. In five of the 14 districts, no teacher who turned over after Round 1 received any award. The pattern is less extreme after Round 2—all districts except Lebanon SSD provided awards to at least one teacher who turned over at the end of the 2012-13 school year—but there was still a concern that a lack of turnover leads to reported awards rather than a lack of awards leading to turnover. Therefore, exploratory analyses were conducted using a technique known as instrumental variables analysis. Intuitively, this technique involves predicting the payout teachers should have received based on their observed characteristics, and then measuring the relationship between their predicted payouts and their actual turnover. Exploratory analyses using a control-function version of the multinomial logit model indicated that payouts need not be treated as endogenous. Therefore, this analysis is based on a multinomial logit model that treats payouts as exogenous. See [Appendix V](#) for details.

Figure 5.3: The Relationship between Performance-Based Payouts and the Probability that Classroom Teachers Turned Over at the End of Round 3, by School and Payout Type



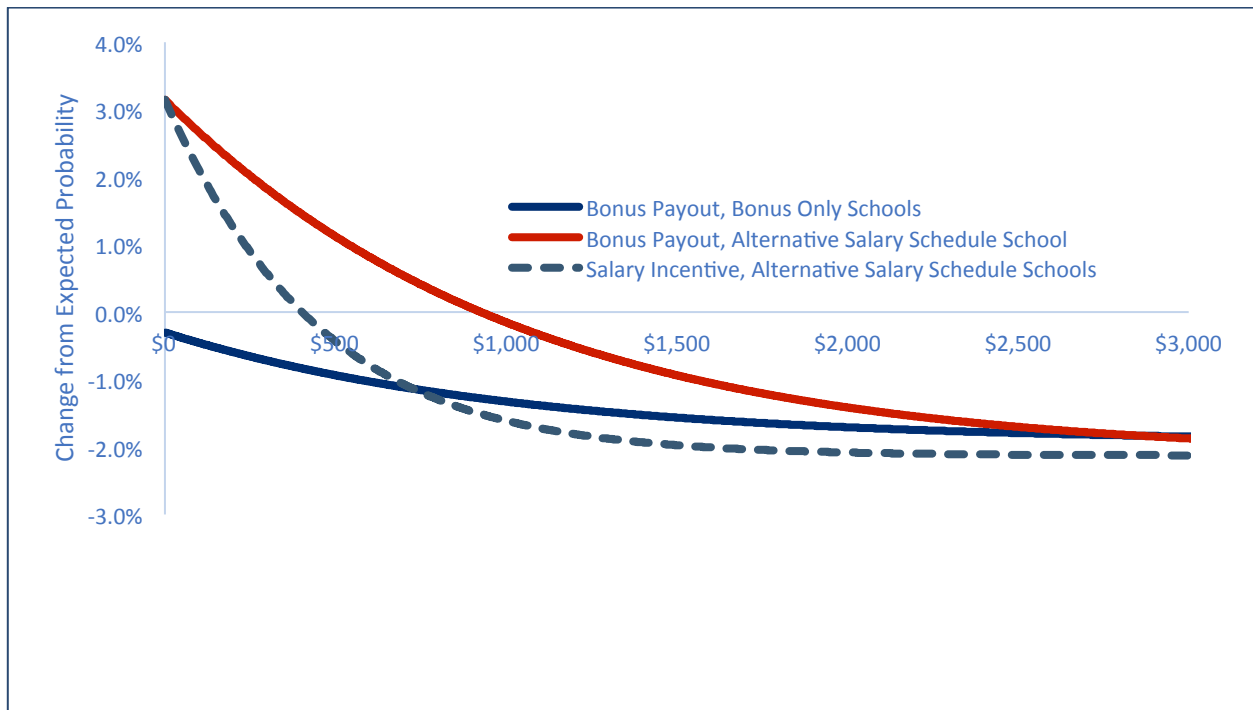
Source: Author's calculations. See [Appendix Table V.5](#).

As the figure makes clear, salary incentives had a much larger impact on teacher turnover than did bonus payouts. A one-time bonus of \$1,000 had the same estimated impact on teacher turnover as a salary incentive of roughly \$350.

Thus, the analysis strongly suggests that the teacher payouts, although typically modest, had a significant influence on the composition of teacher retention. Teachers who received a substantial payout were significantly more likely to stay in a strategic compensation school than would have otherwise been expected; teachers who did not receive a payout or who received only a very small payout were significantly more likely to leave.

But where did they go? To answer this question, researchers examined the relationship between the strategic compensation program and the probability that a teacher would move to another district or leave the Tennessee public school system altogether. If the schools in the strategic compensation program are successfully targeting the incentive payouts to the most effective teachers, then the fact that teacher without payouts are moving on to other districts could suggest that the program has unintended consequences for non-program schools and districts.

Figure 5.4: The Relationship between Performance-Based Payouts and the Probability that Classroom Teachers Moved to Another District at the End of Round 3, by School and Payout Type

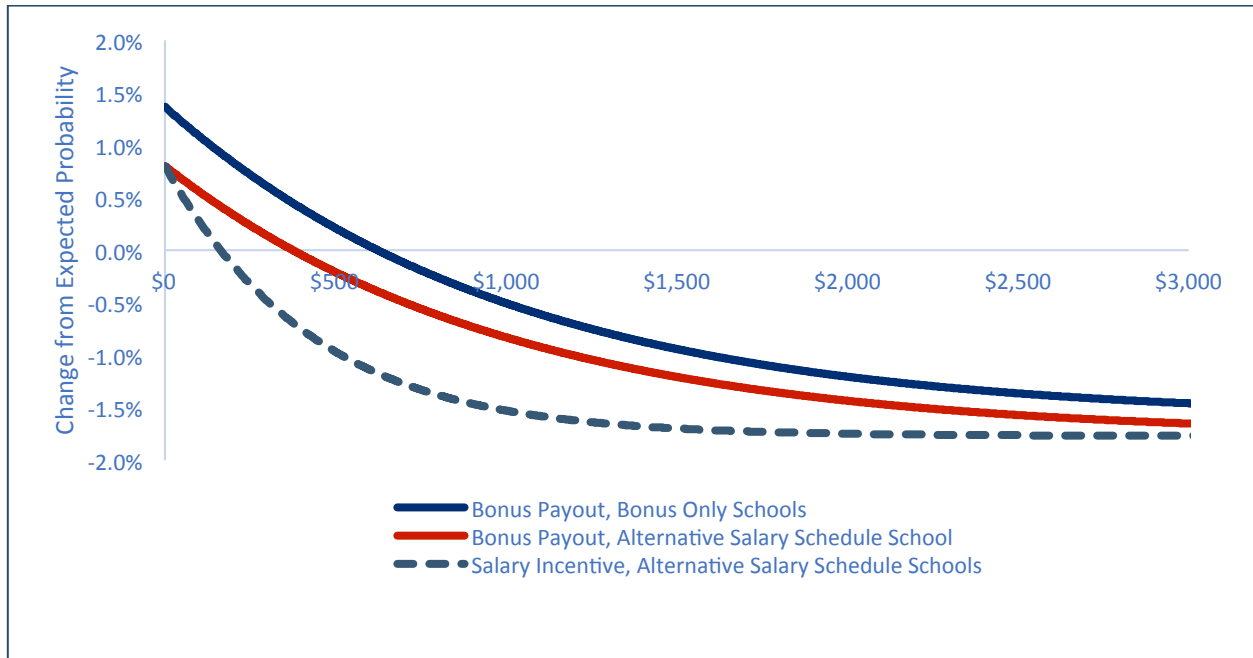


Source: Author’s calculations. See [Appendix Table V.5](#).

As Figure 5.4 illustrates, teachers in bonus-only schools did not have an elevated probability of moving to another district, whether they received a bonus or not. In contrast, a lack of payouts was associated with a significantly higher probability of moving to another district from an alternative salary schedule district. The probability of moving to another district declined as the size of the award increased. Again, salary incentives had a larger impact than bonus payments on teacher behavior.

The Round 3 pattern for bonus only districts was a change from the first two rounds of the strategic compensation program. Figure 5.5 illustrates the relationship between performance-based payouts and the probability of moving to another district after Round 2. (The pattern for Round 1 is similar.) As the figure illustrates, failing to receive a bonus was associated with an elevated probability of moving to another district in both bonus only and alternative salary schedule districts after Rounds 1 & 2.

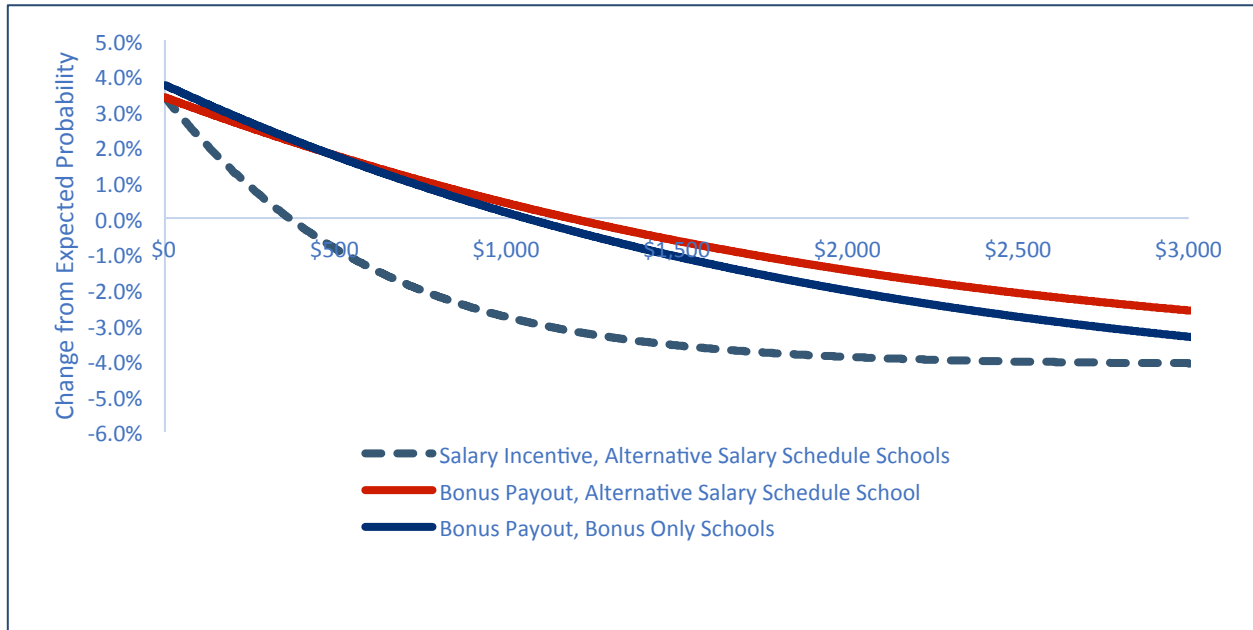
Figure 5.5: The Relationship between Performance-Based Payouts and the Probability that Classroom Teachers Moved to Another District at the End of Round 2, by School and Payout Type



Source: Author's calculations. See [Appendix Table V.5](#).

The probability of leaving the Tennessee public school system was significantly higher for teachers who did not receive an award than would have been expected in the absence of the program for both types of schools in all three years of the strategic compensation program. (See Figure 5.6.) The impact of a one-time bonus award was similar in both alternative salary schedule schools and bonus-only schools, and much smaller than the impact of a salary incentive in the same amount. Teachers who received at least a modest salary incentive and teachers who received a large one-time bonus had a vanishingly small probability of leaving the Tennessee public school system.

Figure 5.6: The Relationship between Performance-Based Payouts and the Probability that Classroom Teachers Left the Tennessee Public School System at the End of Round 3, by School and Payout Type



Source: Author's calculations. See [Appendix Table V.5](#).

Summary of Findings

- Teacher turnover is relatively rare in Tennessee. In a typical year, 91% of classroom teachers are retained, 3% move to another school district and 6% leave the public school system, at least temporarily.
- In bonus-only schools, retention rates were sharply lower than expected after each round of the strategic compensation program.
 - Retention rates for beginning teachers, experienced teachers and retirement-eligible teachers were lower than expected. Retention rates were lower because all types of teachers were more likely to leave the public school system, and beginning teachers were more likely to move to another district after Round 2.
- In schools with alternative salary schedules, retention rates rose after Rounds 2 & 3. Beginning teachers left the public school system at an unusually high rate after Round 1, but that effect appears to have been temporary. Among the relatively small cohort of

beginning teachers in alternative salary schedule schools, turnover was significantly lower and retention was significantly higher than expected after Round 2.

- Following both Round 1 and Round 2 of the program, less effective teachers (as indicated by TVAAS index values) were more likely to turn over in strategic compensation program schools than in similar schools that were not participating in the program. Thus, there is some evidence that the strategic compensation programs are leading to the accelerated departure of relatively ineffective teachers. This pattern arose not only because teachers with low TVAAS scores were more likely to leave strategic compensation schools, but also because teachers with high TVAAS scores became more likely to leave non-program schools during the last two years of the analysis period.
- Teachers who received a substantial payout were significantly more likely to stay in a strategic compensation school than would have otherwise been expected. The probability of turnover by a teacher who received a bonus payout of \$1,000 was roughly half of the expected probability of turnover among teachers who received no award.
- The probability of leaving the public school system was significantly higher for teachers who did not receive an award in both types of schools (bonus-only and alternative salary schedule) in all three years of the strategic compensation program.
- Salary incentives had a much larger impact on teacher retention than did bonus payouts. This is not surprising as salary incentives represent a recurring payout, rather than a one-time bonus and the benefits of a salary incentive can only be received if a teacher remains in the district where she earned the incentive.

Chapter 6: Impact of Strategic Compensation on Student Achievement

In this chapter we examine the impact of strategic compensation on student achievement, as measured by elementary and middle school TCAP scores in mathematics and reading/language arts. This question was also examined in our second- and third-year reports, using data from 2011-12 through 2013-14. Results were inconclusive. The estimated effects were imprecise. None attained conventional levels of statistical significance.

The analyses in this chapter differ from those of the third-year report in two respects. First, we have an extra year of data with which to estimate the effects of strategic compensation. As we have noted in previous reports, the addition of another year of data increases our statistical power to detect program effects. Students have also been exposed to these effects longer, and teachers have had more time to change instructional practices in response to incentives.

Second, we are now able to examine how specific features of strategic compensation plans have affected achievement. As in previous chapters, we look at the design of plans along two key dimensions: the type of performance measure used to determine awards, and the unit of accountability (whether teachers are compensated based on their performance as individuals or as members of teams defined at the grade or subject level, the school, or even in some instances the district).

The remainder of this chapter is divided into three sections. We first re-estimate our preferred models from the third-year report on samples that include data from 2014-15. Second, we estimate models in which we examine the effect of plan design along the aforementioned dimensions. Finally, we conclude with some general observations about lessons learned from strategic compensation initiatives implemented in Tennessee.

Overall Effects

Our third-year report contained results from four different models. Two of those were included primarily to facilitate comparisons with second-year results. We argued against relying on those models on two grounds: (1) bias introduced by measuring outcomes as year-to-year gains when the prior year score itself could have been affected by strategic compensation; (2) drawbacks to the inclusion of student fixed effects when there is little reason to suppose they are necessary to prevent selection bias. These drawbacks include an increase in standard errors

and a tendency for program effects to give greatest weight to outcomes in the first year of program operation, with progressively less weight given to outcomes in subsequent years.³⁶

Our baseline results in this report are obtained using the two preferred models in the year three report. In the first of these models, schools with strategic compensation plans are identified by two variables: a binary indicator for participation, and a second binary indicator when the strategic compensation plan included an alternative salary schedule. The model contains in addition a large number of controls for factors associated with achievement.³⁷ Finally, school fixed effects control for all time-invariant unobserved factors influencing test scores. This means that our estimates of the effect of strategic compensation on achievement are based on within-school variation in outcomes over time. This succeeds in identifying those effects provided that the only important source of this variation, given the large number of other controls in the model, is strategic compensation.³⁸

The second of our baseline models allows for the cumulative impact of strategic compensation to differ from its one-year effect. In this model, the two program indicators are interacted with dummy variables for whether a student is in his second, third, or fourth year in a school that has adopted strategic compensation. We refer to this as the “cumulative exposure” model. We have estimated a variant of this model in which we measure, not how long a student has attending a school using strategic compensation, but how long the plan has been in place. In this variant, even a student new to the school may benefit from the fact that teachers have had longer to change their instruction in response to incentives. We refer to this as the “plan maturity” model.

Results are displayed in Table 6.1 below.³⁹ Only one of the estimated coefficients is statistically significant at conventional levels: the coefficient on fourth-year exposure in column 5. This

³⁶ We lay out these arguments in detail in the third-year report.

³⁷ These controls included student race/ethnicity, free and reduced-price lunch status, and indicators for whether a student received special education services or was an English language learner or a migrant, new to the school, the district, or the state. The model also controlled for the percentages of students at the school in each of these categories. A full set of grade by year interactions was also included. As in prior years, our sample is restricted to students in grades 3-8.

³⁸ The sample period includes several years of data prior to the onset of strategic compensation in 2011-12. The estimated effect of strategic compensation therefore reflects changes in achievement that took place in 2011-12 and the years following in schools that adopted these incentives, compared to changes (if any) that took place over the same period in schools that did not.

³⁹ Standard errors were calculated using the randomization method described in the year two report (Good, 2000; Edgington and Ongehna, 2007).³⁹ This method combines a falsification test with a Monte Carlo analysis. Schools are randomly assigned values of the bonus plan and alternative salary schedule indicators, preserving the actual incidence. (For example, only three districts implemented strategic compensation as an alternative salary

represents the difference between the effect for a student in his fourth year in a program school and the effect in his first year. The sum of the two, representing the effect of strategic compensation in the fourth year, is not statistically significant ($p = .48$). The same holds of all the other cumulative effects.

These results are consistent with those reported in the second- and third-year reports. There are no discernible effects on achievement of adopting a strategic compensation plan, either in math or reading/ELA (columns 1 and 4), nor is there any evidence that effects grow over time as student exposure increases (columns 2 and 5) or as plans and adjustments to them mature (columns 3 and 6). However, standard errors are very large. We cannot rule out with a high degree of confidence the possibility that there were positive, if modest, effects on achievement.

Table 6.1 Effect of Strategic Compensation on Student Achievement

	Mathematics			Reading/Language Arts		
	Baseline	Cumulative Exposure	Plan Maturity	Baseline	Cumulative Exposure	Plan Maturity
	(1)	(2)	(3)	(4)	(5)	(6)
Participation	-.019 (.037)	-.012 (.040)	-.012 (.041)	.006 (.039)	.005 (.041)	.019 (.041)
Participation Year 2[†]		-.018 (.026)	.008 (.023)		-.018 (.017)	.000 (.014)
Participation Year 3[†]		-.029 (.030)	-.020 (.033)		.000 (.024)	-.044 (.025)
Participation Year 4[†]		.028 (.063)	-.023 (.046)		.076 (.037)	-.015 (.030)
Alternative Salary Schedule*	.051 (.091)	.041 (.085)	.080 (.098)	.041 (.062)	-.043 (.060)	-.023 (.066)
Alternative Salary Schedule Year 2^{*†}		-.019 (.058)	-.069 (.052)		.002 (.037)	-.044 (.036)
Alternative Salary Schedule Year 3^{*†}		.088 (.071)	.012 (.069)		.024 (.046)	.023 (.046)
Alternative Salary Schedule Year 4^{*†}		.006 (.114)	-.054 (.096)		-.033 (.068)	-.046 (.060)

Standard errors in parentheses. * Coefficients represent the difference between a bonus plan and plan that takes the form of an alternative salary schedule. † Coefficients represent the difference between effects in the base year and effects in one of these later years.

schedule. In each iteration of our simulations, three randomly chosen districts are assigned this status. Because status is assigned at random, the resulting distribution of coefficient estimates is an empirical approximation to the sampling distribution under the null hypothesis.

Effects of compensation design: performance measures

The preceding analysis looked for an across-the-board effect of strategic compensation. Although we found none, it may be that certain types of plans have had an impact on achievement. Strategic compensation plans vary along two important dimensions: type of performance measure and unit of accountability. We begin by considering performance measures based on test scores.

There are multiple ways to gauge the extent to which a plan uses test-based rewards. Because most plans use performance measures of this kind, a simple binary indicator is not very informative. A count of the number (or proportion) of such awards in a given plan would be somewhat more informative, but would depend on arbitrary decisions about the definition of performance measures. (As we have seen, plans differ considerably in the number of performance measures defined, though similar in terms of what they reward.) Our preferred indicator is the proportion of dollars awarded that fell in this category. Plans that put more of their payouts into this category are presumably giving it greater weight in teachers' calculations of how to respond to the incentives created by the plan.

Payouts reflect two factors: how much a teacher could potentially earn for his performance in this category, and how difficult it was to meet the targets that qualified for a bonus. Both of these should be relevant to teachers' responses. Payouts also reflect a third factor: how successful teachers were in earning awards, a function (presumably) of the effort they put forth in response to these incentives. This third factor makes the payout-based measure a function of how much test scores rose under strategic compensation. To this extent, estimates of the effect on achievement will be upwardly biased. This would be of greater concern if we found statistically significant, positive effects. As it is, notwithstanding any positive bias from this source, we are unable to detect an impact of this variable on student achievement

Results are presented in Table 6.2, along with estimates of two variants of this model.⁴⁰ In the first, we use a narrower definition of test-based performance, restricting it to payouts based on growth in student test scores. Teachers whose award depends on student growth may put more effort into the raising achievement than teachers who are rewarded for the level of achievement. In the second variant, we take the opposite approach, adopting a broader

⁴⁰ A modification of the randomization method described above was used to calculate standard errors. In addition to assigning bonus and alternative salary schedule status at random, we assigned the actual values of the test-based payout variable to random subsets of districts and schools so as to preserve (approximately) the true distribution of that variable.

measure that includes rewards based on teachers' evaluation scores, inasmuch as standardized test results (both in levels and in growth) contribute to overall evaluation scores.

Table 6.2 Effect of Test-Based Performance Pay on Student Achievement

	Model Variants		
	Base model	Restricted ^{††}	Expanded ^{†††}
Mathematics	(1)	(2)	(3)
Test-based payouts[†]	.079 (.089)	.082 (.082)	-.065 (.096)
Bonus plan	-.044 (.057)	-.037 (.050)	.032 (.080)
Alternative salary schedule	.041 (.091)	.054 (.092)	.055 (.093)
Reading/ELA			
Test-based payouts[†]	-.054 (.082)	-.043 (.077)	-.023 (.067)
Bonus plan	.022 (.062)	.014 (.054)	.023 (.056)
Alternative salary schedule	-.033 (.058)	-.042 (.063)	-.038 (.061)

[†]Payouts based on standardized test results, as proportion of total payouts.

^{††}Payouts based on test score growth.

^{†††}Payouts based on test scores or evaluation scores.

In plans that put more weight on student test scores, achievement in mathematics is higher, in reading lower. However, neither of these point estimates is statistically significant. The same pattern holds for the model using awards based on achievement growth. When we expand the category of test-based awards to include awards tied to teachers' evaluation scores, both point estimates are negative. As before, neither is statistically significant.

We have conducted two additional analyses, exploring whether achievement has increased in response to designs that put more weight on other performance measures, unlikely though this would appear.⁴¹ In the first, we use the proportion of awards tied to teachers' evaluation and observation scores, in the second the proportion of awards based on positions that involve additional duties (e.g., coach, mentor, lead teacher) or effort (e.g., tutoring students after

⁴¹ Among these alternatives: the weight given to evaluations and observations in the compensation plan and the weight given to performance measures based on positions that involve additional duties (e.g., coach, mentor, lead teacher) or effort (e.g., tutoring students after regular school hours). The absolute magnitudes of the point estimates were smaller than for test-based measures. All estimates were insignificant.

regular school hours). In both cases the estimated effect of these features on student achievement was small and statistically insignificant.

Effect of compensation design: unit of accountability

Whether it is better to tie performance-based compensation to individual or group performance is a question that has not been resolved either theoretically or empirically. There are arguments on both sides. The argument in favor of individual awards focuses on free-riding: if an award is given on the basis of group performance and the individual believes he is too small a part of the group to make much difference to outcomes, he has little incentive to change his behavior. However, there are advantages to basing awards on group performance. Members of the group can informally monitor one another, making sure each person is doing his share. The same point can be expressed more positively: knowing that others are depending on him and will be aware if he does not do his part, each member has an increased incentive to put forth the effort required to earn an award. Group-based awards also foster collaboration, something that may be of particular value in schools.

We explored this matter by regressing test scores in mathematics and reading/ELA on the proportion of a district's awards paid out for group performance, defined broadly to include grade-level or subject-area teams, the school as a whole, or even the entire district. The models include the same additional controls as above. In mathematics, the estimated effect of group incentives is large, though not significant at conventional levels ($p=.13$). Scores rise .02 standard deviations for each increase of .1 in the proportion of awards paid out for group performance as opposed to individual performance.⁴² However, the large standard error cautions us against taking this estimate at face value: a 90 percent confidence interval includes effects as large as .4, but it also includes 0.⁴³ There is no effect on achievement in reading/language arts.

⁴² One should be cautious about concluding that a district that paid all its awards in the form of group bonuses would gain .2 standard deviations more than a district that paid out all awards for individual performance. Such a projection extrapolates far beyond anything seen in the data: in no district did group bonuses account for more than 30 percent of the total.

⁴³ We have conducted sensitivity tests to see whether this result is due to outcomes in a single district (a possibility, given the small number of districts and the fact that the variation in plan design is at the district level). Re-estimating the model on samples from which we have dropped data from each district in turn, we continue to obtain positive coefficients on the group performance measure. In most cases the estimate changes by no more than a few hundredths. The largest change occurred when district 470 was dropped from the sample, when the coefficient on group performance fell to .092.

Table 6.3 Effect of Team Incentives on Student Achievement

	Base model
Mathematics	(1)
Group-based payouts[†]	.198 (.130)
Bonus plan	-.064 (.052)
Alternative salary schedule	.025 (.090)
Reading/ELA	
Group-based payouts[†]	-.003 (.099)
Bonus plan	.006 (.051)
Alternative salary schedule	-.040 (.061)

It is difficult to know how much credence to place in the estimated effect on mathematics, given the large standard errors and the fact that there was no effect on reading/ELA.⁴⁴ As noted above, one would expect group incentives to encourage collaboration among teachers. We have looked for evidence to that effect in responses to the 2015 Survey of Tennessee Educators conducted by the Tennessee Department of Education. The survey consisted of a core and five modules, with each teacher randomly assigned one of the latter. The first two items of module P asked about the frequency of various types of collaboration and the extent to which each affected instructional practices.⁴⁵ We constructed composite measures at the

⁴⁴ We would expect, if anything, the opposite: that group incentives would have a greater effect on reading/language arts scores than on mathematics scores. With the exception of science, students are unlikely to have much opportunity to improve their understanding of mathematics in any class except mathematics. By contrast, virtually every subject involves reading.

⁴⁵ The survey asked about the frequency of the following types of collaboration: meeting with other teachers to discuss standards, instruction, and/or student learning; working with other teachers to develop materials or activities for particular classes; reviewing student assessment data with other teachers to make instructional decisions; observing another teacher's classroom to get ideas for your own instruction or to offer feedback; meeting with team of teachers: subject area, grade level, or interdisciplinary teams; and meeting with the whole faculty at my school. With respect to each of the foregoing, teachers selected one of these answers: Never, About Once a Semester, About Once a Month, Two or Three times a Month, About Once a Week, More than Once a Week. These responses were coded as 1 through 6. We constructed a crude composite measure of the extent of collaboration by summing the responses. Responses therefore ranged from 6 through 36. The second question on the survey asked about the impact of the same types of collaboration. Teachers selected from these answers: I did not change the way I plan and/or teach; I made small changes to the way I plan and/or teach; I made major changes to the way I plan and/or teach. These were coded as 1 through 3. We summed these responses to obtain

school level of the extent and impact of collaboration. We found no relationship between either of these measures and the use of group performance incentives in a district's strategic compensation plan. We repeated this analysis using only teachers of mathematics.⁴⁶ The results were unchanged: if anything, there was less collaboration as the proportion of payouts made to groups rose.⁴⁷

To summarize, there is some evidence that performance incentives are more effective when awarded to teams of teachers (where "team" could be as broad as the entire school or district) as opposed to individuals. The point estimate we obtain is substantively important and near the margin of statistical significance. However, this finding is best regarded as suggestive rather than definitive. First, any hypothesis test runs the risk of a Type I error—reading meaning into a result that has occurred merely by chance. Given the number of different hypotheses tested in this chapter, it would be surprising if we did not have one or two that were significant (or nearly so) by chance. In addition, we find this effect only in mathematics achievement, though it is not evident why instructional teams would be any less important in reading/ELA than in math. Finally, we find no evidence that incentives directed at teams have induced higher levels of teacher collaboration, although this would seem to be a principal mechanism through which such incentives affect student outcomes.

Lessons from the strategic compensation initiative

We begin with what has not been learned. We have not learned that strategic compensation failed to increase student achievement. Our findings are not negative: they are inconclusive. Even our strongest finding—that bonuses awarded to teams are more effective than bonuses awarded to individuals – is hedged with uncertainty. In brief, we simply do not know very much about the effect of strategic compensation on achievement.

Why, after four years and an expenditure of several million dollars, have we not learned more? The answers to this question are the real lessons to be taken away from this experience.

a composite measure of the extent to which collaboration had influenced a teacher's own practice. We then averaged this over teachers in a school.

⁴⁶ Our operational definition was 10 students tested in mathematics.

⁴⁷ In a regression of the extent of collaboration on group-based awards and a binary indicator for participation in strategic compensation, the coefficient on group-based awards was negative and marginally significant ($p = .06$). However, the coefficient was smaller and insignificant when the regression equation included district fixed effects.

1. Participation in strategic compensation was a school-level decision, if not a district-level decision. This meant that schools were the level at which meaningful variation occurred, and that identifying the impact of strategic compensation would require comparing outcomes across schools.⁴⁸
2. Unfortunately, standardized test results at the school level are quite noisy. Schools have good and bad years for unpredictable reasons, shifting their standing relative to one another. The greater the background variation of this kind, the harder it becomes to detect changes due to a single factor, such as strategic compensation. If scores go up in schools implementing strategic compensation relative to schools that did not, is that the result of the policy or something that might well have happened anyway? The less stable school-level performance is from one year to the next, the more probable it becomes that the answer is the latter.
3. To offset the effect of this noisy environment, it is necessary to average results across many schools. This was a major weakness of the strategic compensation initiative in Tennessee: not enough schools participated, given the background level of noise in achievement data. The result: large standard errors that have made it difficult to draw conclusions about the effect of this policy.
4. The small sample size was exacerbated by the variation from district-to-district in the design of strategic compensation plans. With very large samples, this variation could have been exploited to examine which types of plans led to the greatest gains in achievement. But the number of schools adopting any one plan was too small for this purpose, and the variation in plans was an unhelpful source of heterogeneity in the phenomenon studied, rendering effective sample sizes smaller still.
5. The true magnitude of the standard errors is not evident when they are calculated using conventional formulas (e.g., the Huber-White covariance matrix that is robust to clustering). Hypothesis tests conducted using such standard errors are too likely to reject the null. Given that there is a new round of initiatives underway funded by the Teacher Incentive Fund, we particularly want to call the attention of the Department to this finding. Unless a more sophisticated approach is taken to the calculation of standard errors, researchers are likely to draw incorrect inferences

⁴⁸ This includes difference-in-difference estimators that compare changes taking place in one set of schools to changes taking place in another.

about the impact of strategic compensation, employing tests with a probability of a Type I error considerably greater than they suppose.⁴⁹

In short, the design of strategic compensation plans implemented in Tennessee from 2012-2015 has made it very difficult to ascertain whether there has been an effect on student achievement. How, then, might future programs be structured so as to avoid this problem? Some combination of the following would help.

- a. Increase the size of awards. The average award (to teachers who received anything) was \$1,500 in 2015. This is a fairly modest sum, well below 5 percent of total compensation. Modest incentives like this are not apt to produce more than modest responses. But modest responses are difficult to detect.
- b. Enlist more districts and schools in the program. This is particularly important if it continues to be the case that all teachers in a school are covered by the strategic compensation plan. School-level performance is noisy, changing for reasons unrelated to strategic compensation. In order to detect the effect of performance-based pay on achievement against this noisy background, data need to be collected from more schools.
- c. Assign teachers randomly to two groups: those who are eligible for strategic compensation, and those who are not. This will be most helpful if random assignment occurs within each school, effectively controlling for background variation in school performance. This might be made more palatable to teachers and administrators if the teachers in the control group (not eligible for bonuses) receive an across-the-board raise instead. There are, however, other problems posed by creating treatment and control groups within each school, notably the possibility of spillover, whereby improved instructional practices among the treatment teachers are also adopted by teachers in the control group.
- d. Random assignment of schools to treatment and control groups. This is the next best thing if random assignment of teachers is not feasible. To the extent that the background factors causing school performance to change unpredictably from year

⁴⁹ In our experience, we have found that a properly specified hierarchical model allowing for sources of variation at multiple levels can produce results equivalent to a randomization analysis (see, for example, Springer et al., 2013) But such models are impracticable unless the observations are nested, which is not the case with the achievement data used in this study.

to year operate at the district level, affecting all schools in the district in more or less the same way, random assignment of schools within the district will isolate the estimated effect of strategic compensation from the influence of those factors.⁵⁰

⁵⁰ An example of such a factor would be a mathematics curriculum used throughout the district that happened to be closely aligned with the topics emphasized on the state math test in one year, not so closely aligned with the form of the test used in another year.

Concluding Remarks

Since 2011-12, considerable time, effort, and money have gone into strategic compensation reform in Tennessee public education. It is difficult to see that much has been accomplished.

There has been a modest improvement in teachers' attitudes toward performance-based pay. However, virtually all of that improvement occurred between the first and second years of the program. Since then, little has occurred that has changed many minds. No more than half the teachers recently surveyed indicate that strategic compensation has improved teaching or student learning in their schools, raised job satisfaction, or helped to recruit and retain more effective teachers.

Our own analyses have failed to establish that strategic compensation has had an important impact on student achievement. This does not necessarily imply that there have been no positive effects. Rather, any such effects have not been strong enough to stand out against the imprecision of our estimates. Overall, performance-based pay has not reduced teacher turnover. There are some indications that it improves retention of high value-added teachers, but this effect does not show up consistently in all years. It is strongest in the three districts that have adopted alternative salary schedules, weak to non-existent in districts that award performance pay in the form of bonuses.

District officials in about half the districts that implemented strategic compensation under TIF, IAF, or CSF are no longer planning to continue their programs in the same form when this funding runs out. Several are complying with mandatory salary differentiation by paying teachers more for assuming additional duties—not for teaching excellence.

In short, performance-based compensation remains unpopular with teachers. School officials are not persuaded it is worth continuing. The research fails to make the case that there are significant benefits.

All this notwithstanding, we suspect that interest in compensation reform within education will continue, and that we have not seen the last of attempts to tie the compensation of educators more closely to results. What can we take away from the experience of the last four years to guide these efforts in the future? Based on our research, we offer the following pragmatic suggestions.

1. Simplify performance pay plans. Most of the performance pay plans implemented in Tennessee over the past four years have been complex, relying on numerous performance measures and complicated formulas for calculating bonuses. Teachers are often confused about what is and isn't in their own plans. This complexity is inimical to the design of effective incentives: it is difficult to motivate someone who doesn't understand the basis of an award. All this complexity, moreover, appears to serve little purpose: our research has not found that finer details of plan design are strongly related to teachers' views of strategic compensation or student achievement.
2. Increase the awards. Average bonuses have been too small to drive large (and therefore detectable) changes in behavior. A straightforward, sustainable way to increase performance pay would be to replace the "step-and-lane" raises under traditional salary schedules with a schedule in which pay increases are linked to performance. Although the amounts at stake in any one year may not be large (on the order of 1-2% of base pay), the cumulative impact over time can be quite substantial. To produce significant salary differentials, however, meaningful distinctions must be drawn between teachers on the underlying performance measures (e.g., summative evaluation scores). An evaluation system in which nearly all teachers receive top marks year after year will merely reproduce the old salary system under a new name.
3. Make greater use of team or other group awards. Schools require teamwork to function effectively. Team-based bonuses are the appropriate incentive to elicit cooperation and collaboration. Our own research has found suggestive (though far from definitive) evidence that team-based awards had a positive effect on achievement in mathematics, if not in other subjects.
4. If possible, conduct large-scale pilot studies in which teachers/teams/schools are randomized into treatment and control groups. It has been difficult to learn much from strategic compensation reform as it has been implemented over the past four years in Tennessee, in large part because all meaningful variation occurred at the school level. Effects therefore had to be identified by comparing one group of schools to another group. Outcomes at the school level are too volatile to learn much in this manner unless there are many schools in both groups. This has not been the case.

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Appendices

- Appendix IV1: [The Representativeness of Respondent Samples from the 2014-2015 Strategic Compensation Survey](#)
- Appendix IV2: [Factor Analysis for 2014-15 SCS](#)
- Appendix IV3: [2014-15 Statewide Strategic Compensation Survey Output](#)
- Appendix IV4: [Regressions of Survey Clusters on Teacher Characteristics, Bonus Receipt, and Bonus Expectations](#)
- Appendix IV5: [Regressions of Survey Clusters on Plan Characteristics and Bonus Receipt](#)
- Appendix V: [Turnover Analysis](#)