

How K-12 Public School District Fiscal Incentives
Are Impacting Teacher Recruitment:
What Do The Data Tell Us?

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CHAPTER I

Overview of Study

Introduction

Recruiting qualified teachers to hard-to-staff schools and subjects in K-12 public schools is an ongoing concern for districts throughout the United States. For decades, school leaders have reported staffing shortfalls in math, science, special education, and in schools serving high poverty students. Compounding these chronic staffing shortages are changing student demographics and high school graduation requirements that are fueling prevalent teacher shortages in foreign language and bilingual education.

Accountability pressures of the landmark federal legislation, No Child Left Behind Act of 2001 (NCLB), further constricted the teacher labor market. This federal law mandated teachers hired after the 2002-03 school year in schools supported with Title I funds be “highly qualified” in all core academic subjects they teach. NCLB’s definition of a qualified teacher is one who demonstrates subject-matter expertise, has matriculated to at least the level of a bachelor’s degree, and has full state licensure or certification. Meeting the mandates of NCLB has many school districts struggling to find teachers who meet the “highly qualified” designation in an already stretched teacher labor market.

The national demand for high quality teachers persists as evidenced by the 2009 American Recovery and Reinvestment Act which includes substantial funds for Race to the Top (RTTT). RTTT is a contest for federal funding sponsored by the United States Department of Education designed to spur states to improve students’ educational outcomes. A key focus of RTTT is improving teacher effectiveness based on growth in student performance data by raising teacher quality. A requirement to compete for the federal funds is states must submit specific strategies for improving teacher quality.

Recent plans by the U.S. Department of Education to combat the lack of high quality teachers were announced in July 2014. Under a new initiative, the Department of Education is investing \$4.2 million to help states and school districts craft and implement plans to attract high

quality teachers to schools with high percentages of minority and economically disadvantaged students (Sparshott, 2014).

Provisions of federal and states initiatives have focused unprecedented attention on the link between teacher quality and student achievement. Much attention has been devoted to the issue of improving the quality of the teaching workforce as empirical research points to teacher quality as key to increasing student achievement. A review of research reveals conventional measures of teacher quality, which include years of experience, degree earned, and certification, are not indicative of teacher quality as measured by student outcomes (Odden & Kelly, 2002). Evidence from empirical education research supports the intuitive notion that teachers' subject matter knowledge is a better predictor of teacher quality (Goldhaber, 2007; King-Rice, 2003). Research by Darling-Hammond (2000), Hanushek (1997), and Sanders and Rivers (1996) suggests teachers who have a major in their subject area elicit greater gains from students than do out-of-field teachers, controlling for students' prior academic achievement and socioeconomic status.

Given the well-documented centrality of teacher quality to student learning, widespread teacher shortages in hard-to-staff schools and key academic areas are alarming. In 2003, the U.S. Department of Education indicated that approximately one in four high school math teachers and one in five science teachers lack a major or minor in their field. Statistics such as these, coupled with new standards for high achievement by all students that require new teachers to be more skilled than in the past, have drawn attention to the need for improving the recruitment of highly qualified teachers.

Many different recruitment strategies have been initiated at the federal, state, and local levels in efforts to overcome staffing shortages that across-the-board higher salaries for all teachers could not resolve. To what extent such strategies are positively impacting the recruitment of teachers is unknown. Few empirical investigations examine teacher recruitment strategies, particularly those with a fiscal component. The scant research that does exist regarding market-based compensation systems primarily focuses on experienced, traditionally prepared teachers working in the profession. Studies on targeted recruitment strategies utilized by districts, such as fiscal incentives for teaching in subject shortage areas, are sparse. Many fundamental questions remain about the efficacy of market-based compensation as a recruitment strategy to broaden the pool of teachers and attract high quality teachers.

This research seeks to answer questions regarding the effectiveness of district fiscal incentive policies on the recruitment of two types of teachers: nontraditional teachers and teachers with a college major in the shortage field they instruct. To ascertain if such incentives are impacting the teacher work force, analysis examines whether they are broadening the pool of teacher candidates by attracting nontraditional teachers. Also investigated is whether these policies are improving teacher quality by recruiting more teachers with subject matter expertise as evidenced by having a college major in the subject area they instruct. Lastly, the impact of fiscal incentives on teachers' salaries is explored.

The research questions motivating this study are described in the section that follows. Subsequent sections of this overview chapter define nontraditional teachers and describe their prevalence in the teacher labor market. Then, a summary of the research strategy is provided.

Purpose of Study: Research Questions

The purpose of this study is to examine how district fiscal recruitment incentive policies affect the recruitment of teachers to the teacher labor market for K-12 public school districts. For this research, district fiscal recruitment incentive policies are defined as monetary rewards districts use to recruit teachers, both new entrants to the teacher workforce and veteran teachers. No distinction is made between fiscal incentives that are offered just once, such as a hiring incentive during the initial recruitment of a new teacher, and fiscal incentives that extend for a longer time period. For example, districts may offer teachers an economic incentive to recruit them to instruct a hard-to-staff subject and the incentive is reoccurring as long as the teachers continue instructing the hard-to-staff subject.

If districts are to remain competitive in an increasingly constricted labor market, policymakers at all levels need a better understanding of what types of districts are using economic recruitment incentives and what types of teachers are responding to these incentives. To provide educational stakeholders with quantitative, longitudinal data for evaluating the effectiveness of district fiscal recruitment incentive strategies, two research questions are explored:

1. What is the effect of district fiscal incentives on teacher recruitment? What types of teachers are districts recruiting with fiscal incentives? When districts use fiscal incentive policies to attract teachers to subject shortage areas, are they recruiting

- more nontraditional teachers? When a district switches from having to not having a fiscal recruitment incentive policy, or vice versa, does the same district attract more teachers with a major in the shortage field they instruct?
2. What is the impact of district fiscal recruitment incentives on teachers' salaries? Do the salaries of subject shortage area teachers working in districts offering fiscal recruitment incentives provide evidence of these teachers receiving a fiscal recruitment incentive? If so, what is the dollar amount of the fiscal recruitment incentive?

These questions are investigated through descriptive statistics, regression analysis, and estimations of teacher salary equations using data from four consecutive cycles of the Schools and Staffing Survey 1990 -2004 (SASS). Data analysis begins with the creation of quantitative profiles using demographic variables for nontraditional teachers and districts with fiscal recruitment incentive policies. Next, the impact of district fiscal incentive policies for shortage fields on the recruitment of nontraditional teachers and teachers with a major in the shortage subject area they instruct is analyzed. Analysis predicting whether a district is likely to recruit a different mix of teachers with fiscal incentives than without fiscal incentives is conducted. Finally, salary equations for subject shortage area teachers working in districts offering economic rewards to attract these teachers are estimated to identify evidence of fiscal recruitment incentives and the dollar amount of the incentives.

Nontraditional Teachers: A Definition

Nontraditional teachers offer a promising pool of teachers to fill hard-to-staff subject and locations based upon several assumption regarding their qualifications and work experiences. They are presumed to have strong subject matter expertise, academic aptitude, and professional experiences-attributes considered to be indicative of teacher quality (Chambers, 2002; Dai, Sindelar, Denslow, Dewey, & Rosenberg, 2007; Haselkorn & Hammerness, 2008; Resta, Huling, & Rainwater, 2001).

Identifying teachers with a major in the shortage field they instruct via SASS is straightforward as all four SASS cycles contain the consistent questions for doing so. Unfortunately, pinpointing nontraditional teachers in SASS is more complicated as a review of relevant research reveals no consensus regarding specific determinates for characterizing a teacher as nontraditional. There is, however, a generally accepted definition of a nontraditional teacher in

education literature and practice- a college graduate who enters the teaching profession after having work experience in a field outside of education. Nontraditional teachers' undergraduate majors are typically not education. Unlike traditional teachers who enter teaching after having earned a bachelor's degree in education and a subsequent teaching certification, nontraditional teachers' pathways into teaching are varied. Many enter teaching through alternative certification programs while others elect different options, such as obtaining a master's degree in education.

Researchers have identified myriad subgroup classifications of nontraditional teachers according to their distinct entry points into the profession, demographic profiles, and other differentiating factors. Hasselkorn and Hammerness (2008) described three subgroups of nontraditional teachers in their review of literature regarding career changers: delayed entrants, mid-career teachers and second-career teachers. The classification of "nontraditional teacher" is not limited to individuals who had a prior career. Teach for America, for example, specifically targets college seniors and recent college graduates from non-teaching disciplines to teach in high-needs schools. Other subgroups of nontraditional teachers include individuals who are motivated to enter teaching due to a perceived fit with their lifestyle, such as mothers returning to the workforce who want a family-friendly schedule.

Without a definitive definition for what constitutes a teacher as nontraditional, researchers and policymakers have classified teachers as nontraditional when referring to a heterogeneous group of teachers that differ in some way from traditional teachers, traditional in the sense that their preservice preparation was campus-based during their undergraduate studies. Thus, the ability to determine with certainty who is a nontraditional teacher depends upon data that is ambiguous.

For this study, included in the category of nontraditional teachers are mid-career professionals, prior military personnel, and retirees. Specifically, nontraditional teachers for this analysis are defined as individuals who are:

- 1) mid-career professionals with an undergraduate degree in a field other than education who have expertise and experience in their fields;
- 2) retiring professionals with an undergraduate degree in a field other than education who have expertise and experience in their fields; and
- 3) prior military personnel with an undergraduate degree in a field other than education.

Although investigation of veteran, nontraditional teachers would enrich this research, variation in the wording of teacher survey questions across SASS cycles prohibits the identification of this type of nontraditional teacher for all survey years. As such, for this study, nontraditional teachers are limited to those who are new entrants to the teaching profession, and veteran, nontraditional teachers are excluded.

Research Strategy

The analytic strategy for answering each of the two research questions, including a summary of relevant data needed for the analysis, is described below.

Research Question # 1: What is the effect of district fiscal incentives on teacher recruitment? What types of teachers are districts recruiting with fiscal incentives? When districts use fiscal incentive policies to attract teachers to subject shortage areas, are they recruiting more nontraditional teachers? When a district switches from having to not having a fiscal recruitment incentive policy, or vice versa, does the same district attract more teachers with a major in the shortage field they instruct?

Answering this research question requires investigation of how fiscal incentives affect the composition of the teacher workforce. Regression analysis will predict whether a district using fiscal incentives attracts more nontraditional teachers. Also investigated with regression analysis is whether a district switching from having to not having a fiscal recruitment incentive policy, or vice versa, attracts more teachers with a major in the shortage field they instruct than when the same district does not use fiscal incentives.

Research Question # 2: What is the impact of district fiscal recruitment incentives on teachers' salaries? Do the salaries of subject shortage area teachers working in districts offering fiscal recruitment incentives provide evidence of these teachers receiving a fiscal recruitment incentive? If so, what is the dollar amount of the fiscal recruitment incentive?

No nationally representative data is collected at the district level identifying the dollar amount of the incentives used to recruit teachers. The best currently available data on a national level that can be used to determine the type of teacher districts are targeting with fiscal recruitment incentives is teachers' salaries.

The final step in data analysis is identifying evidence of district fiscal recruitment incentives in the salaries of subject shortage area teachers working in districts offering these incentives. This is accomplished with estimations of teachers' salary equations to find evidence of fiscal incentives and the dollar amount of the incentives. Meaningful dollar amount differences between the districts' reported starting salary for teachers and self-reported salaries of subject shortage area teachers working in districts offering incentives to recruit these teachers is considered evidence of a fiscal recruitment incentive.

Estimations of the dollar amount of financial incentives districts have used to recruit different types of teachers are valuable for assessing the effectiveness of these incentives on teacher recruitment. Whether or not analysis indicates fiscal incentive policies have an impact on teacher recruitment, it is interesting to know how much districts are spending on this type of incentive. Perhaps districts are spending small amounts of funds on fiscal incentives relative to teachers' base pay, and yet the districts are attracting better qualified teachers. Or, maybe the districts are allocating large sums of money relative to teachers' base pay for fiscal incentives, and the districts are not recruiting more qualified teachers. Insight into the amount of money districts are spending on fiscal recruitment incentives will help policymakers gauge the return on their investment.

Summary

Staffing shortages persist in high-need schools and subjects as the higher across-the-board wages many districts have offered failed to recruit enough qualified teachers. Mounting political pressure to improve teacher quality in high-needs schools and subjects has spurred policymakers to experiment with a variety of fiscal incentive strategies designed to recruit high-quality teachers, despite a lack of evidence such policies are effective.

Federal, state, and district policymakers are enacting fiscal recruitment incentive initiatives with little guiding evidence as to whether such policies are effective at attracting high quality teacher to hard-to-staff subjects and locations. A lack of reliable, comprehensive data regarding district fiscal recruitment incentive policies has impeded rigorous, empirical research. Most states fail to collect and analyze data to aid policymakers in determining recruitment needs and evaluating the effectiveness of recruitment policies.

Policymakers and practitioners are increasingly looking towards nontraditional teachers as a promising solution to solve the problem of a lack of teachers with skills and knowledge in subject areas where chronic staffing shortages persist. However, a review of the research literature reveals very little is known about nontraditional teachers. Variations in the definition of “nontraditional,” in addition to a lack of consistent and reliable data, have hampered efforts to answer the most basic questions about nontraditional teachers, such as how many are represented in the teacher labor market.

The need for quantitative research investigating the impact of district financial incentives on the recruitment of nontraditional teachers and high quality teachers is growing. Policies and programs to expand the pool of qualified teachers and attract them to hard-to-staff subject and locations are proliferating yet empirical research investigating the effects of recruitment strategies is scarce. Findings from this empirical study will help identify trends in the recruitment of teachers, specifically nontraditional teachers and teachers with a major in the shortage field they instruct. Additionally, this research will provide quantitative data to help policymakers determine whether fiscal recruitment incentives are a public policy investment that should be reconsidered or recrafted as a strategy for addressing persistent difficulties in recruiting teachers with specific skills and knowledge to high-need subjects and locations.

CHAPTER II

Literature Review

Introduction

As efforts to recruit qualified teachers grow, it is important to begin asking what effects district fiscal recruitment policies have on the teacher labor market. A key issue for policymakers as they develop a variety of recruitment policies is whether these policies have the desired positive effect – augmenting the pool of qualified nontraditional teacher candidates for hard-to-staff schools and subjects and attracting more high quality teachers. Addressing this issue begins with a review of research related to the recruitment of nontraditional teachers and the fiscal incentive policies designed to attract both nontraditional and high quality teachers to high-needs schools and subjects.

Prevalence of Nontraditional Teachers in the Teacher Labor Market

No nationally representative research provides conclusive evidence of how many nontraditional teachers are in the teacher labor market. Variations in definitions of “nontraditional teacher” impede accurate estimates of how many nontraditional teachers are working in public K-12 schools. Because most nontraditional teachers are believed to be alternatively certified, questions regarding their prevalence are almost without exception answered with findings from reports and research of alternative certification programs.

Alternative certification routes have become a major source of new teachers. The number of alternative certification programs has proliferated since they first began to appear as a certification option over twenty years ago. According to an annual report on teacher quality by the United States Department of Education and the Office of Postsecondary Education (2008) nearly every state now offers an alternative route into the teaching profession, compared to only a handful of states in the 1980s. The most recent state data submitted to the National Center for Education Information indicated approximately 59,000 teachers were issued an alternative teaching certificate in 2005, up from 275 in 1985 (Feistritz, 2009). Nationally, nearly one out

of every three new teachers being hired in 2005 were certified through an alternative route (United States Department of Education & Office of Postsecondary Education, 2008).

While the increase in numbers of alternatively certified teachers is dramatic and points to a widespread interest in alternate route programs, the reliability of estimates of alternatively certified teachers represented in the workforce is uncertain. Each state defines what constitutes an alternative certification program, giving much variability in program definition and little comparability of programs across states. Some states include specific subgroups of alternative certification programs, such as Teach For America (TFA), as alternative routes to teaching certification while other states do not. Few state estimates of the number of alternatively certified teachers are disaggregated by program type, TFA for example, or by teachers' professional characteristics, such as teachers that are career changers.

Specific subgroups of alternative certification programs (United States Department of Education & Office of Postsecondary Education, 2008) maintain accurate estimates of the number of program participants. For example, TFA has placed approximately 12,000 new teachers into the nation's schools since the program's inception in 1990. In 2008, TFA reported placing approximately 3,600 new teachers across the country, representing a 28% increase over the prior year (TeachForAmerica.org, 2009). In 2006, Troops to Teachers reported more than 8,400 program participants had been hired as K-12 teachers since 1994 when the program began with 411 participants (United States Government Accountability Office, 2006). Since the launch of the New York City Teaching Fellows (NYCTF) program in 2000, the number of participants has increased from 325 to more than 775 in 2009, with over 8,800 fellows currently teaching in New York City public schools (New York City Teaching Fellows, 2009).

There is one study estimating the number of nontraditional teachers represented nationally in the teacher labor market. Marinell (2009) investigated the number of first year teachers entering teaching from a prior career, or mid-career teachers. Marinell defined a mid-career teacher as being older than 27 years of age before beginning full-time teaching and having engaged in one of the following activities the year prior to entering teaching: a career outside education, an education-related job other than teaching, working as a university professor, a member of the armed forces, retired, or attending a university. Using national, cross-sectional data from five cycles of the Schools and Staffing Survey, Marinell found the percentage of mid-

career teachers in their first year of teaching nearly doubled from 20% to 39% between 1987-88 and 2003-04.

Characteristics of Nontraditional Teachers

Generalizations of nontraditional teacher characteristics are almost exclusively drawn from studies of alternatively certified teachers. Studies of alternatively certified teachers have found they offer a pool of prospective teachers that is older, and more ethnically and gender diverse than present enrollment patterns in undergraduate teacher education, which remain overwhelmingly under age 30, white, and female.

The most comprehensive study of alternatively certified teachers was conducted by Feistritzer in 2005. Feistritzer's (2005a) national survey of nearly 2,700 teachers entering alternative certification programs¹ showed a higher percentage of males (37%) and minorities (32%) than in the overall teacher workforce with 25% males and 11% minorities.² A majority of alternatively certified survey respondents (63%) reported being 30 years of age or older.

Constantine, Player, Silva, Hallgren, Grider, and Deke (2009) compared characteristics of alternatively and traditionally certified teachers. On average, alternatively certified teachers were more likely than traditionally certified teachers to be minority (55% versus 27%, respectively). Alternatively certified teachers were also, on average, older (33.7 years) than traditionally certified teachers (29.4 years).³

Described below are several studies examining characteristics of nontraditional teachers emerging from the large-scale alternative-route programs of TFA, Troops to Teachers, and NYCTF. Findings from these studies may not be representative of the larger population of nontraditional teachers as TFA, Troops to Teachers, and NYCTF limit recruitment to candidates with specific characteristics. For instance, TFA recruits college seniors and recent college graduates so participants are predominately less than 25 years of age. NYCTF targets recent college graduates and mid-career professionals, thus the age distribution of participants is more wide-ranging. Troops

¹ The survey sample respondents included members of Troops to Teachers, NYCTF, and the Milwaukee Teacher Education Program.

² For Feistritzer's (2005a) study, the comparison data for the overall teacher population is from the National Center of Education Statistics, 2003.

³ More detailed information regarding the study by Constantine et al. is found under the heading "Quality of Nontraditional Teachers" in the subsequent section of this literature review.

to Teachers recruits from the armed forces, whose population is overwhelmingly male. Variations in characteristics of nontraditional teachers entering teaching through one of these large-scale alternative route programs are likely to be attributable to the programs' differing recruitment strategies.

Teach For America

Xu, Hannaway, and Taylor (2008) analyzed TFA teachers working in North Carolina high schools in 2000-01 through 2006-07. The researchers found TFA teachers were 13% minority as compared to 25% of all non-TFA traditional teachers and 26% of non-TFA traditional teachers with less than three years of experience. An analysis of TFA teachers instructing grades 3 through 8 in Houston by Raymond, Fletcher, and Luque (2001) revealed approximately 20% of TFA teachers were minority as compared to almost 60% of non-TFA teachers. Decker, Mayer, and Glazerman (2004) compared TFA teachers to two control groups of non-TFA teachers in 2002-03 who instructed grades 1 through 5 in six regions across the United States. They found a majority of the TFA teachers were female (69%) and white (67%) as were the control group of all non-TFA teachers (87% female and 11% white) and the control group of novice, non-TFA teachers (84% female and 13% white).⁴

Troops to Teachers

Two national surveys of Troops to Teachers identified a large percentage of males and whites. A 2005 national survey of 2,103 Troops to Teachers members by Owings, Kaplan, Nunnery, Marzano, Myran, and Blackburn (2006) found 83% were male and 39% were minority. Feistritzer's (2005b) survey of nearly 1,500 Troops to Teachers members profiled 82% as male and 37% as non-white. Survey findings by Feistritzer also identified Troops to Teacher members as older than teachers overall, with 0.3 % of respondents reporting they were younger than 30 years of age as compared to 11% of the overall teacher workforce.⁵

⁴ More detailed information regarding the studies by Xu et al., Raymond et al., and Decker et al. are found under the heading "Quality of Nontraditional Teachers" in the subsequent section of this literature review.

⁵ For Feistritzer's (2005b) study, the comparison data for the overall teacher population is from the National Center of Education Statistics, 2003.

New York City Teaching Fellows

Boyd, Grossman, Lankford, Loeb, and Wyckoff (2005) conducted a study of large-scale teaching pathways into New York City public schools between 1998-99 and 2003-04. Included in their analysis was a summary of the characteristics of NYCTF and TFA members employed in NYC public schools for their first year of teaching. Boyd et al. found members of NYCTF were more likely to be male (33%) than members of TFA (28%) and College-Recommended teachers (23%).⁶ NYCTF members were more likely to be white (60%) than TFA members (57%), and less likely than College-Recommended teachers (74%).⁷

Quality of Nontraditional Teachers

The primary rationale for increased recruitment efforts targeting nontraditional teachers is nontraditional teachers are believed to offer attributes indicative of teacher quality- academic aptitude, subject matter knowledge, and professional experience- attributes that are valuable in the teacher labor market. Whether the depth of content knowledge and practical experiences that nontraditional teachers presumably bring with them from prior careers effectively applies in the classroom is not well explored empirically.

Studies of nontraditional teacher quality are largely limited to qualitative case studies, non-experimental observations, and self-reporting surveys examining teacher characteristics and preparation/training. For example, Grissmer's (2000) qualitative analysis of nontraditional teachers who were mid-career changers and retirees indicated many who entered teaching from other professions bring competencies that transcend occupational boundaries, such as a strong sense of commitment, maturity, and professionalism. A 2005 study by Owings et al. (2006) surveyed 2,103 Troop to Teachers members and their school administrators. More than 90% of principals surveyed reported teachers prepared via Troops to Teachers were more effective in classroom management and instruction than traditionally prepared teachers based upon classroom observations. Feistritzer's

⁶ Boyd et al. categorized "College Recommended" teachers as those whose teacher certifications were obtained through a traditional route.

⁷ More detailed information regarding the study by Boyd et al. are found under the heading "Quality of Nontraditional Teachers" in the subsequent section of this literature review.

(2005b) survey analysis of nearly 1,500 Troops to Teachers members found almost 62% held at least a master's degree.

Although observational or survey findings offer valuable insight into attributes often associated with the quality of nontraditional teachers, they provide little conclusive evidence regarding the instructional quality of nontraditional teachers as evidenced in student achievement outcomes. Podgursky (2004) points out that “while there have been articles published about alternative certification, few meet the standards of scientific rigor that would permit researchers to draw conclusions about the effects of nontraditional teachers on student performance” (p.2).

Empirical research utilizing student achievement outcomes as a measure of nontraditional teacher quality has been slow to emerge in the research literature. At present, there are limited numbers of states and few districts having consistent assessments of student learning from one grade to the next that are linked to teacher data. Only a handful of quantitative studies have been conducted examining nontraditional teacher quality as measured by student achievement outcomes.

Constantine et al. (2009) studied the effectiveness of elementary teachers, as measured by student performance, who enter teaching through traditional and alternative certification routes.⁸ The sample of alternatively certified teachers was disaggregated according to the selectivity of the certifying program. Teachers certified through highly selective alternative certification programs, defined as having a minimum requirement of 3.0 undergraduate GPA, were excluded from the study. The rationale for the exclusion was to make the samples of alternatively and traditionally certified teachers more similar; alternative certification programs with less selective entrance requirements are similar in terms of entrance requirements to the education programs attended by traditionally certified teachers in the study.

Using an experimental design, Constantine et al. randomly assigned students to either a traditionally or alternatively certified teacher in the same grade and school in order to attribute differences in student performance to teacher effectiveness. The sample size over the two-year study period of 2004-06 numbered eighty-seven traditionally certified teachers and eighty-seven alternatively certified teachers, all of who had teaching experience of five years or less.

Findings indicated there was no statistically significant difference in student achievement as evidenced on standardized tests between alternatively and traditionally certified teachers.

⁸ Constantine et al. defined traditionally certified teachers as having completed teaching certification requirements prior to beginning teaching and alternatively certified teachers as having completed teaching certification requirements after beginning teaching.

Constantine et al. measured the correlation between student performance and observable teacher characteristics that research has shown may have an effect on student performance (cognitive ability as measured by SAT and selectivity of undergraduate institution, race and ethnicity, gender, and age). None of the observable teacher characteristics correlated with the student achievement outcomes.

Studies examining nontraditional teacher quality as measured by student achievement outcomes have emerged from the large-scale alternative-route programs of TFA, Troops to Teachers, and NYCTF. These studies are reviewed below.

Teach For America

A review by the Urban Institute (Xu, et al., 2008) of TFA teacher participants' effectiveness at the high school level indicates a positive effect on student performance relative to traditional teachers. Xu et al. analyzed student end-of-year-course (EOC) exams linked to teacher data in various North Carolina school districts for 2000-01 through 2006-07. The positive findings for TFA teachers were statistically significant across subject areas, with a 0.10 standard deviation improvement in EOC performance relative to a traditional teacher.⁹ For science, the effect of having a TFA as compared to a traditional teacher was greater, with a 0.18 standard deviation improvement in EOC.

Xu et al. also found the academic qualifications of TFA teachers as measured by PRAXIS scores and selectivity of undergraduate institution were significantly higher than for traditional teachers. On average, TFA teachers scored nearly 0.4 standard deviations higher on the PRAXIS than all non-TFA traditional teachers and non-TFA traditional teachers with less than three years of experience. Approximately 62% of TFA teachers graduated from "most selective" or "very selective" undergraduate institutions, as rated by *Barron's Profile of American College*, compared to 22% of all non-TFA traditional teachers and 26% of non-TFA traditional teachers with less than three years of experience.

Using year-end learning gains of students from grades 3 through 8 in Houston schools, Raymond, Fletcher, and Luque (2001) compared the effectiveness of TFA teachers to non-TFA teachers with similar years of teaching experience. They found students of TFA teachers had higher

⁹ For Xu et al., traditional teachers received their license through an approved teacher education program at an accredited North Carolina institution of higher education.

test score gains in math than did students of non-TFA teachers. The effect size varied from less than 2 % of a standard deviation to over 10%, depending upon which grade was used in the analysis. Academic qualifications of TFA teachers were higher than those of non-TFA teachers. While 100% of TFA teachers in the sample held bachelor's degrees, the percentage of non-TFA teachers with bachelor's degrees varied, with extremes of 65% in 2000 and 94% in 1997.

Darling-Hammond, Holtzman, Gatlin, and Heilig (2005) used the same data as Raymond et al., but disaggregated teachers based upon their certification type. The analysis compared student performance of certified and uncertified TFA teachers and non-TFA teachers.¹⁰ Analysis of fourth and fifth grade student performance from 1996-97 through 2001-02 found mixed effects. Students of certified TFA teachers performed relatively better on tests of math than certified non-TFA teachers, but worse on tests of English language arts. A summary of the findings indicated TFA teachers were nearly as effective as other non-TFA teachers when controlling for teacher experience.

Laczko-Kerr and Berliner (2002) assessed the effectiveness of non-certified teachers,¹¹ including TFA members, as compared to traditionally certified teachers in five low-income districts in Arizona. Recently hired, non-certified teachers were matched with recently hired, certified teachers instructing grades 3-8. Results indicated students of TFA teachers underperformed on state mandated student achievement tests by an equivalent of two months on a grade equivalent scale as compared to similar students of traditionally certified teachers in math, reading, and language arts.

In a randomized experimental study, Decker, Mayer, and Glazerman of Mathematica (2004) compared student outcomes of TFA teachers to non-TFA teachers in 2002-03.¹² The sample of 100 teachers represented 17 schools from Baltimore, Chicago, Los Angeles, Houston, New Orleans, and the Mississippi Delta. Nearly 2,000 students in grades 1 through 5 were randomly assigned to teachers within the same grade and school. Two separate comparisons were conducted between the samples of TFA teachers and non-TFA teachers. One comparison included TFA teachers and non-TFA novice teachers, defined as those teachers in their first year of teaching. The other comparison consisted of TFA teachers and a combination of both novice and veteran non-TFA teachers.

¹⁰ For Darling-Hammond et al., a certified, non-TFA teacher held one of the following certifications: standard, provisional, professional, out-of-state, alternative, or emergency/temporary.

¹¹ For Laczko-Kerr and Berliner, non-certified teachers included those with an emergency, temporary, or provisionally certification.

¹² Non-TFA teacher control groups included uncertified teachers and teachers certified traditionally or alternatively.

Decker et al. found TFA teachers were more effective at improving student math scores than were both of the non-TFA control groups, though there was no statistically significant difference in student reading scores between the TFA and non-TFA teachers. TFA teachers' academic backgrounds were strong, with over two-thirds having attended an undergraduate institution classified as "most competitive," "highly competitive," or "very competitive" by *Barron's Profile of American Colleges*. Less than 4% of all non-TFA teachers or novice non-TFA teachers had graduated from undergraduate institutions ranked at these levels.

Using six years of math and reading achievement data from New York City students in grades 4 through 8, Kane, Rockoff, and Staiger (2006) analyzed the effects of TFA teachers in comparison to traditionally certified teachers. Their findings were similar to those of Decker et al. of *Mathematica*; both studies found a small positive effect for TFA teachers on student math achievement relative to certified teachers, and no differences in effect for reading. The effect for math was somewhat larger for middle school teachers (.027) than for elementary school teachers (.015), controlling for years of teaching experience.

New York City Teaching Fellows

Research by Boyd et al. (2005) simultaneously investigated the effectiveness of teachers from TFA and NYCTF. Using New York state-wide exam data from students grades in 3 through 8 that linked students' performance data to their respective teachers, Boyd et al. compared the student achievement of students taught by traditionally certified teachers (College Recommended) to teachers from TFA and NYCTF.

Findings for middle school student math performance showed students of first-year TFA teachers had higher achievement than did students of first-year traditionally certified teacher. Student math performance for first-year NYCTF teachers was similar to first-year traditionally prepared teachers. When comparing NYCTF and traditionally prepared math teachers with three years of teaching experience, students of NYCTF teachers outperformed students of traditionally prepared teachers. For English, the students of first-year traditionally prepared teachers outperformed both first-year NYCTF and TFA teachers. A comparison of student performance in English when instructed by NYCTF and traditionally prepared teachers with three years of teaching experience revealed students of NYCTF teachers performed as well as traditionally prepared teachers.

Boyd et al. noted student achievement differences in both math and English for alternative prepared teachers as compared to traditionally prepared teachers were not large (2 to 5 percent of a standard deviation). Variation in teacher effectiveness within the traditional and alternative pathways was much greater than the average differences between the differing pathways. Alternatively certified members of NYCTF, on average, had stronger measures of academic qualifications than the traditionally prepared teachers (College Recommended) or those with temporary licenses. A greater percentage of NYCTF teachers (38%) than College Recommended teachers (8%) attended a “mostly” or “highly competitive” undergraduate institution as classified by *Barron’s Profile of American Colleges*.

Strategies for Recruiting Nontraditional Teachers and High Quality Teachers

Given nontraditional teachers’ potential to address chronic staffing deficiencies and to increase the quality of the teacher labor force, policymakers have pursued a wide array of recruiting strategies to attract them to the profession. Examples of recruitment strategies have included alternative routes to certification, smaller class sizes, extra time for lesson planning, expanded leadership opportunities, and fiscal incentives. Such recruitment strategies are often not limited to nontraditional teachers. Many recruitment policies are designed to also incentivize traditional, experienced teachers of high quality to work in schools having difficulty in hiring qualified teachers. Several of the more prevalent recruiting strategies are described below.

Alternative Certification

Proliferating over the past decade are federal and state programs designed to increase the quality of teachers in hard-to-staff schools and subjects by recruiting nontraditional teachers. Forty-seven states fund and/or regulate an alternative-route-teaching program to recruit college graduates with at least a bachelor’s degree (Swanson, 2008).

In order to recruit people who might not otherwise enter the teaching profession, alternative certification programs offer features traditional certification programs do not: shortened and less expensive certification process, more practical training, and quick access to teaching. These features are believed to be attractive to nontraditional teacher candidates who want to reduce the opportunity

costs of entering the teaching profession, particularly if they are not certain they want to teach long-term (Johnson, et al., 2005).

Reports from states and institutions offering alternative-route programs show a substantial number of nontraditional teachers have been recruited via various alternative certification routes. The National Center for Education Information estimated approximately 59,000 individuals were issued teaching certificates through alternative routes in 2005-06, up from approximately 50,000 in 2004-05 and 39,000 in 2003-04 (Feistritzer, 2009).

Alternative-route-certification programs targeting particular subgroups of nontraditional teachers have recruited a significant number of nontraditional teachers. Teach For America, a Peace-Corp-like program begun in 1990, selects and places college graduates with a variety of bachelor majors from prestigious undergraduate institutions as teachers in low performing schools (Ingersoll, 2006; Kuenzi, 2005). In 2008, Teach For America placed approximately 3,600 new teachers in low-income districts across the country, representing a 28% increase over the prior year (Teach For America, 2008).

Troops to Teachers facilitates a mid-career change from the military into teaching. The goal of the program is to help military personnel obtain a teaching position, especially in high-needs subject areas and locations, by providing financial assistance and counseling. Between the inception of the Troops to Teachers program in 1994 and an assessment of the program's effectiveness by the United States Government Accountability Office in 2005, more than 8,400 program participants reported being hired as elementary and secondary teachers (United States Government Accountability Office, 2006).

The New York City Teaching Fellows program began in 2000 to address severe teacher shortages. The program's goal is to recruit mid-career professionals, recent college graduates, and retirees to instruct subject areas with teacher shortages in the hardest-to-staff New York City public schools. As of 2008, approximately 60% of the more than 8,000 teaching fellows have transitioned into teaching from other occupations.

Federal Initiatives for Teacher Recruitment

Substantial federal resources are being channeled into recruitment efforts specifically aimed at nontraditional teachers as a means for staffing subjects and locations with teacher shortages.

Most recently, President Obama July 2014 announced that the U.S. Department of Education is dedicating \$4.2 million to help state and school districts develop and enact plans for recruiting high quality teachers to high-needs schools (Sparshott, 2014).

President Obama's fiscal year 2015 budget includes \$300 million for a new Race to the Top for Equity contest. Funds from this contest are dedicated to helping schools attract effective, high quality teachers. This new Race to the Top contest is an iteration of the original the Race to the Top education reform contest created by the American Recovery and Reinvestment Act of 2009. The original Race to the Top is a federal initiative providing \$300 million for improving teacher quality, of which \$100 million in grants will be dispersed under the Teacher Quality Enhancement Recovery Plan to support state efforts in recruiting high quality individuals to the teaching workforce (Klein, 2009).

In 2008, the U.S. Department of Education (2008) renewed funds totaling \$44 million for grants through the Transition to Teaching program. The program, which began in 2003, seeks to recruit mid-career professionals, recent college graduates, and paraprofessionals as nontraditional teacher candidates in high-needs schools. In 2003, Transition to Teaching participants becoming teachers-of-record in high-needs schools numbered twenty-seven, and steadily rose to seventy-four in 2006 (United States Department of Education, 2007a).

A good indicator of the severity of the recruiting challenge for qualified math and science teachers was President Bush's policy initiative, Adjunct Teacher Corps, specifically designed to attract math, science and engineering professionals into education. President Bush's fiscal 2008 budget sought \$25 million for the initiative, and although Congress enacted the initiative, it was not funded. The budget description of the Adjunct Teacher Corps program stated, "the initiative would concentrate on helping schools find experienced professionals, thereby helping to bring into the teaching fold those who would otherwise be reluctant" (United States Department of Education, 2007b).

Fiscal Incentives for Recruiting Teachers

Despite substantial growth of recruitment programs and policies over the past two decades, school districts continually report staffing shortages in hard-to-staff schools and subjects. For instance, national data on teacher recruitment from the 2003-2004 Schools and Staffing Survey

indicated approximately sixty-six percent of all schools reported at least some difficulties finding qualified candidates for instructing math and physical science (Podgursky, 2008).

Public perception is that individuals with knowledge and skills attractive to both school districts and other employers outside of education are foregoing the teaching profession in lieu of higher salaries in non-education fields. Wages, both at initial entry into the teaching profession and throughout subsequent years of employment, are conventionally believed to remain too low to entice potential teacher candidates to the profession, particularly those with subject matter expertise in math and science.

A potentially promising strategy is “front-loading” teacher compensation. The intent of front-loaded pay structures is to give new teachers higher salaries earlier in their teaching career and less in later years of their career as an inducement towards improving districts’ capacity to recruit teachers (Grison & Strunk, 2011; Liu, Moore, & Peske, 2004; Murnane, Singer, Willett, Kemple, & Olsen, 1991). School leaders in Denver, the District of Columbia, and New York City have considered “front-loading” teacher compensation as a recruitment strategy (Sawchuk, 2009).

While higher starting salaries may entice more teacher candidates to the profession, there is no evidence that higher starting salaries for all teachers will result in increased teacher quality. Ballou and Podgursky (1999) argued higher salaries have had little impact on the overall quality of newly recruited teachers as measured by observable teacher quality indicators, such as SAT score, academic major, and selectivity of college attended. They concluded features of the teacher labor market, including certification requirements and district hiring practices, counteract positive effects of increasing salaries across-the-board.

Researchers emphasize potential teacher candidates with technical skills or strong academic backgrounds who can earn higher salaries than offered by the traditional salary schedule often find teaching a relatively unattractive career option (Dee & Keys, 2004; Goldhaber, DeArmond, Liu, & Player, 2008). Podgursky (2008), Goldhaber and Liu (2005), Ballou and Podgursky (2001), and Levin (1985) suggested the rigidity of the single salary impeded districts’ flexibility in attracting teachers.

Within the single salary schedule, teachers’ salaries are determined by years of experience and by obtaining an advanced degree, but not for field of specialization, professional experience prior to entering teaching, or willingness to work in hard-to-staff schools. Ballou et al. (2001)

found standardization of teacher pay within the single salary schedule “deprives the managers of public schools of the authority to adjust an individual teacher’s pay to reflect market conditions” and prevents districts from offering higher salaries in shortage fields or locations that are difficult to staff (p. 16).

Analysis of the relationship between teacher labor markets and salary structure by Goldhaber et al. (2008) echoed those by Ballou (1996)¹³ - the teacher labor market does not compensate differentially for quantifiable measures of job candidate quality as does the private sector. When controlling for college selectivity as a measurement of teacher quality, teachers with a technical major see little to no financial reward while private sector employees with a technical major see rewards increase over time (Goldhaber, et al., 2008).

Advocates for alternatives to the single salary schedule suggest flexible compensation in the form of market-based fiscal incentives align with teacher labor market realities (Ballou & Podgursky, 1999) and are necessary to attract individuals to teach in hard-to-staff schools and subject areas. The premise behind fiscal incentives is to induce scarce and qualified teachers to fill staffing deficiencies by providing a compensating differential for potentially unattractive job characteristics or for opportunity costs.

The most common fiscal incentives are some form of market-based compensation, for example signing bonuses, forgiveness of student loans, assistance with relocation costs, and housing assistance programs (Feistritz, 2009; Hirsch, Koppich, & Knapp, 2001; Krieg, 2006; Kuenzi, 2005; Loeb, Miller, & Strunk, 2009; Milanowski, et al., 2007). Other examples of fiscal incentives include differentiated pay within the district salary schedule, such as placing high-demand teachers above entry level on the single salary schedule, and providing salary schedule credit for non-teaching experience (Heneman, Kellor, & Kimball, 2005).

A growing number of states and school districts are experimenting with a variety of fiscal incentives as recruitment strategies in efforts to attract qualified nontraditional and traditional teachers to high-needs schools and subjects. Florida and California have been experimenting with salary bonuses for recruiting teachers to work in low-income schools. Hawaii has given \$3,000 per year to teachers who agree to work in hard-to-fill locations and \$3,000 to licensed special education teachers. Licensed teachers in Mississippi who buy a home and move into one of the state’s geographical critical-shortage areas are eligible for a home loan of up to \$6,000

¹³ Ballou uses college selectivity as a quantifiable measure of teacher quality.

(Sachetti, 2006). Prince (2003) described a program in New York City that offered a fifteen percent pay raise for teachers to work in challenging schools. Arkansas offered a \$4,000 signing bonus to teachers who signed a contract to work in high-priority districts and \$3,000 each of the next two years if they stay employed in the district (Lambert, 2008). Houston has provided newly recruited teachers signing bonuses of up to \$5,000. Elementary bilingual teachers and high school math, science and foreign language teachers in Dallas were offered bonuses of \$5,000 beginning with the 2009-10 school year (Goolsby & Unimuth, 2008).

A large-scale example of a district using a market-based compensation system is Denver's ProComp initiative, which combines base pay with bonuses based on teaching in high-needs schools or subjects, increasing student performance, and participating in professional development. New Denver teachers working under ProComp have the opportunity to earn, on average, approximately \$7,000 in bonuses (Sawchuk, 2009).

Federal programs offering fiscal recruitment incentives have been initiated to encourage both nontraditional and high quality teachers to work in hard-to-staff school and subjects. Federal student loan forgiveness or cancellation is available to eligible, highly qualified teachers. Depending upon the initiation date of the student loan, teachers are eligible to have up to \$17,000 in Stafford student loans forgiven in exchange for working five years or more in a high poverty school. The cumulative amount of Stafford loan forgiveness is projected to total over \$1.6 billion by the end of 2014.

Cancellation of Perkins student loans of up to 100% is available to eligible, highly qualified teachers instructing in high-poverty schools or in the subject shortage areas of math, science, special education, foreign language, and bilingual education (Kuenzi, 2005). As of June 2004, \$595 million in Perkins loans were cancelled under this program (United States Department of Education, 2005).

Impact of Higher Pay on Teacher Recruitment

Many states and districts have begun to experiment with fiscal incentives as a recruitment strategy despite scant evidence attesting to the effectiveness of such strategies. A key question for policymakers is whether fiscal incentives will have a significant impact on recruiting nontraditional teachers and high quality teachers. Studies investigating the impact of higher pay on teacher

recruitment, the amount of fiscal incentive needed to recruit prospective teachers, the prevalence of market-based compensation strategies for teacher recruitment, and the effectiveness of market-based compensation programs begin to address this fundamental question.

Impact of Higher Pay on the Recruitment of Prospective Teachers

Use of fiscal incentives as a recruitment practice is supported by research evidence suggesting compensation plays a key role in the recruitment of teachers. A number of studies concluded an individual's decision to enter the teaching profession and to work in hard-to-staff schools is sensitive to pay level, with low starting pay a chief deterrent.

Hart and Associates (2008) conducted a recent survey of 2,392 college graduates aged twenty-four to sixty who were not working in the teaching profession. Their findings indicated starting pay was the most influential factor to these potential career changers.¹⁴

The influence of salaries and an individual's characteristics (academic ability, education, gender, race, family background and academic major) on one's occupational choice of teaching was explored by Han and Rossmiller (2004). The subjects of their study were teachers or potential teachers who had completed an education degree and/or their teacher certification. The sample was drawn from the National Longitudinal Study of the High School Class of 1972. Their analysis indicated effects of salary between teaching and alternative occupations for both prospective and practicing teachers were evident for males to a greater degree than for females, math and science teachers as opposed to other academic areas, and middle and high school levels rather than elementary.

Milanowski, Longwell-Grice, Saffold, Jones, Odden, and Schomisch (2007) used focus groups and surveys to estimate the average importance preservice teachers attributed to starting pay, student characteristics, and working conditions. They found starting salary was a significant factor when considering working in an urban school, but an equally important factor was working conditions. The researchers noted their findings were biased by several influencing factors. The local labor market surrounding the three higher education institutions attended by the preservice teachers was producing a net surplus of teachers. Hence, obtaining a teaching position regardless of a salary may have been a more important consideration than the starting salary. Also, only 7% of

¹⁴ More detailed information regarding the study by Hart and Associates is found under the subheading "Amount of Fiscal Incentive Necessary for Recruiting Prospective Teachers" in the subsequent section of this literature review.

the preservice teachers sampled were majoring in math, science, and special education. These majors are in high demand in most parts of the country, and therefore, may demand a salary premium from districts offering differential compensation.

Starting salary was determined by Bacolod (2007) to be a key determinant in new college graduates' occupational choice. For those who did choose to teach, salary had less of an influence in determining where new teachers selected to work. Bacolod's sample of new college graduates was drawn from the Baccalaureate and Beyond Longitudinal Study, which tracks a nationally representative sample of the 1992-93 college senior class. Of the 10,569 college graduates in the sample, 12% represented those who were currently teaching or had taught.

A combined survey analysis and focus group study of undergraduate students with knowledge in math, science and technology by Milanowski (2003) found pay level was a significant factor making a career in teaching less attractive. Undergraduate students participating in the focus groups represented twenty-three education majors and nineteen math- and science-related majors. Survey respondents included 208 randomly selected undergraduates whose major required substantial coursework in math and science.¹⁵

In response to research suggesting low starting pay can be a deterrent to attracting talented individuals who might otherwise consider the teaching profession, many districts have raised teacher salaries across-the-board. While there is strong empirical support that, in general, potential teacher candidates and practicing teachers are responsive in their entry decisions to higher compensation, it is uncertain whether raising teachers' salaries overall will result in a larger number of teacher recruits or increase teacher quality.

Research evidence on the impact of universally higher salaries on teacher recruitment and quality remains mixed. Figlio (2002) analyzed data from the 1987-88 and 1993-94 cycles of the Schools and Staffing Survey to investigate the hiring implications for districts that increased the starting salary of all newly hired teachers to a level relative to other teaching salaries in the same county. For nonunion school districts, the author found a positive, statistically significant relationship between a given district's new teacher salaries and that district's probability of hiring a better quality teacher. Teacher quality was measured by the selectivity of the teachers' undergraduate schools and the teachers' bachelor majors in the same subject matter they were

¹⁵ More detailed information regarding the study by Milanowski (2003) is found under the subheading "Amount of Fiscal Incentive Necessary for Recruiting Prospective Teachers" in the subsequent section of this literature review.

hired to instruct. This relationship was not found in unionized school districts.

In contrast, Ballou and Podgursky (1995) argued the use of higher pay for all teachers restricts the inflow of high quality individuals to teaching as measured by academic backgrounds and cognitive skills. Ballou et al. suggested higher across-the-board salary increases for all teachers encourages deferment of retirement, thereby suppressing the intake of new teachers. Ballou and Podgursky (1999) also argued teacher labor market features, such as district hiring practices and teacher certification requirements, offset potential positive effects of across-the-board salary increases.

Corcoran (2007) proposed research examining across-the-board wage increases might have failed to find any significant effect on teacher quality and recruitment because the size of the wage increase was too small to detect.

Amount of Fiscal Incentive Necessary for Recruiting Prospective Teachers

There exists little current research on what amount of compensation can overcome teachers' reluctance to instruct in high-needs schools and subjects or to enter the teaching profession. Recent research estimates the amount of financial incentive that would be necessary would need to be substantial.

Milanowski (2003) used surveys and focus groups of undergraduate students with knowledge in math, science, and technology to identify how large of a salary differential would be required to attract them to the teaching profession. Study participants indicated a significant increase in entry-level salary (e.g. 25-50%) would be needed to attract a substantial proportion of the undergraduates with math-and science-related majors to teaching in lieu of other career opportunities. Entry-level salary at which the students would consider a teaching career was correlated with the entry-level salary they anticipated receiving in the non-teaching field they intended to enter. The percentage increase in starting teacher salary that would be sufficient to attract these students into teaching varied relative to their major, with higher increases need to attract more engineering students than other sciences. Generalizability of study results was limited as the sample size was small and drawn from only one university.

A comparative study on teacher and private sector labor markets conducted by Goldhaber, DeArmond, and Player (2008) suggested compensation incentives designed to attract teachers with technical skills and strong academic backgrounds from selective universities may need to be

considerable. This appeared to be especially true for individuals with prior professional experience who were entering the teacher labor market.

Hart and Associates' (2008) survey of 2,392 college graduates aged twenty-four to sixty who were not working in the teaching profession indicated the amount of the starting salary necessary to attract them to teaching was dependent upon the earnings relative to their current profession. Of the survey respondents who said they would consider teaching as a career option, the starting salary necessary to draw them into teaching varied between \$20,000 and above \$80,000. Twenty-one percent of respondents indicated starting salaries would have to be raised to \$50,000 to \$59,000, 24% said between \$60,000 and \$79,000, 13% responded \$80,000 or higher, and twelve percent 12% said between \$20,000 and \$39,000. Three in ten of those who would not consider a career change into education cited low pay as the primary prohibitive factor.

Using data from the 1999-00 Schools and Staffing Survey, DeArmond and Goldhaber (2007) estimated a private school teacher may be induced by a \$1,800 salary differential to move to a high-poverty school from a low-poverty school, but they could not say the same would be likely for public school teachers. They concluded estimating the amount of a salary differential to attract public school teachers to more challenging locations would require experimentation with different levels of salary incentives for various types of schools.

Goldhaber, DeArmond, and DeBurgomaster's (2007) survey of Washington State teachers found the salary differential necessary, on average, to compensate teachers for working in hard-to-staff schools would amount to \$4,280 annually. When teachers who thought no differential was necessary were excluded from the analysis, the average differential increased to \$5,322.

In Kentucky, Winter and Melloy (2005) studied the effects of signing bonuses on attracting applicants to schools classified according to student performance. They conducted recruitment simulations with experienced teachers and non-experienced teachers enrolled in university preparation programs totaling 336 participants. Neither experienced nor inexperienced teachers found a 10% signing bonus was sufficient to attract them to any particular school vacancy, regardless of the student performance classification of the school.

Prevalence of Market-based Compensation Policies for Teacher Recruitment

As market-based compensation policies are a relatively new strategy for recruiting teachers, there exists little research on how many districts are using these policies or which types of market-based compensation districts are using. Only a handful of studies identify the prevalence of market-based compensation policies; two studies describe state-level incentive policies and two examine district-level incentive policies.

A review of state-level teacher recruitment policies was conducted by Editorial Projects in Education (EPE) Research Center in 2008 for *Education Week's* annual Quality Counts issue. EPE reported sixteen states provided incentives to attract teachers to hard-to-staff subjects, and twenty states offered incentives for teachers accepting positions in hard-to-staff schools (Olsen, 2008). There was no identification of what type of incentive was offered, fiscal or nonmonetary. Differentiation between incentives for new versus experienced teachers was not provided.

Loeb, Miller, and Strunk (2009) analyzed potential teacher labor market effects of state-level recruitment, retention and assignment incentives policies in operation in 2005. They described the frequency with which states offered various types of teacher incentives (e.g. tuition for teacher training, assistance with student loan repayment, housing benefits, postponed retirement incentives, and salary supplements), the number of states offering incentives at different stages of teachers' careers, and the number of states restricting the various types of incentives to certain kinds of teachers.

The majority of states (forty-eight) operated multiple incentive policies targeting more than one stage of a teacher's career. The teacher career stage most often targeted by state incentive policies was the period from teacher preparation to initial certification but not yet teacher of record (thirty-nine states). The most popular type of incentive was tuition for teacher training (forty-seven states), followed by salary supplements (thirty-three states), with the most common salary supplement given for Nation Board Certification. Thirty-six states were more likely to restrict eligibility for incentives to teachers of subject shortage areas rather than to teachers instructing in hard-to-staff schools (twenty-seven states). Only seven states offered incentives to teachers of subject shortage areas working within hard-to-staff schools.

The Loeb et al. study neither specified what type of incentive was provided during the various career stages nor described how often each type of incentive was offered during the

various career stages. No distinction was made between state policies targeting nontraditional versus traditional teachers throughout the analysis.

Balter and Dancombe (2008) surveyed 494 school district superintendents in the state of New York (excluding New York City) in 2004. One purpose of the survey was to identify the types of recruitment incentives offered by New York districts. The researchers separated recruitment incentives into two categories. Traditional recruitment incentives included additional compensation for extracurricular or administrative functions and flexibility in crediting teaching experience from other districts and states. Nontraditional recruitment incentives included crediting job experience outside of teaching for placement on the single salary schedule, tuition support, fiscal assistance with home purchase, signing bonuses, and additional compensation for National Board Certification, teaching in hard-to-staff schools and subject shortage areas.

Findings from the study indicated most New York school districts employed a wide variety of recruitment practices. The number of recruitment strategies used increased with district size and wealth. Slightly over 40% of districts used at least one nontraditional incentive, with urban districts more likely than other types of districts to use nontraditional incentives. Seven percent of the districts used additional compensation as an incentive for teaching in hard-to-staff subjects and less than 1% offered additional compensation for teaching in hard-to-staff schools. Generalizability of study results is limited as the sample was drawn from only one state.

Podgursky (2008) reviewed features of K-12 public school districts' compensation systems using weighted data from various cycles of the SASS. Part of his analysis focused on the incidence of districts using various forms of market-based compensation, including extra pay for teaching in less desirable location, teaching in subject shortage area, NBPTS, excellence in teaching, and professional development.

Findings indicated districts' use of fiscal incentives to recruit teachers for instructing in less desirable locations and in subject shortage areas increased from 1999-00 to 2003-04. In 2003-04, 4.6 % of districts offered incentives for teaching in less desirable locations, an increase of one percentage point from 1999-00. The percentage point increase was larger for incentives for teaching in shortage fields, growing from 10.4 % in 1999-00 to 11.9 % in 2003-04. Between the 1999-00 and 2003-04 surveys, the percentage of district using three or more incentives increased from 2.9 % to 5.1 %. The most common incentive offered by districts was for NBPTS certification. The number of districts offering this incentive rose by ten percentage points

between the 1999-00 and 2003-04 surveys, making it the incentive with the largest increase in usage.

Podgursky's analysis also identified how many districts offered incentives for teaching in subject shortage areas. Because this question was consistently asked on all cycles of the SASS, 1987-88 through 2003-04, the analysis examined an interval of sixteen years and was not limited to the four-year period from 1999-00 to 2003-04 as was other analysis. The incidence of districts providing incentives for subject areas rose steadily from 7.5 % in 1987-88 to 11.9 % in 2003-04. Districts providing incentives for the subject shortage areas of math, science, bilingual education, and foreign language increased by approximately three percentage points for each subject area. Of these subject areas, bilingual education had the largest increase with 0.8 % of districts offering incentives for teaching bilingual education in 1987-88 to 4.3 percent in 2003-04. The subject shortage area of special education had the largest increase overall, with an increase from 2.2 % in 1987-89 to 7.3 % in 2003-04.

With this analysis, Podgursky provided one of the first, nationally representative studies offering evidence of the actual implementation of district fiscal incentive policies for recruiting teachers. His examination of various cycles of the SASS suggested the number of K-12 public school districts utilizing fiscal incentives to recruit teachers is growing. Nevertheless, Podgursky's findings leave many of the fundamental questions regarding fiscal incentives for recruiting teacher unanswered. For example, his analysis does not account for the type of teachers districts are targeting with fiscal recruitment incentives, or the dollar amount of the fiscal incentives.

Evaluating Effectiveness of Market-based Compensation Policies

Until recently, most of the attention within the educational literature pertaining to fiscal incentives has been devoted either to distributing funds within the single salary schedule or altering the single salary schedule (Young, Delli, Miller-Smith, & Buster, 2004). Research examining the effectiveness of the various market-based compensation policies states and districts are increasingly implementing to recruit prospective teachers is sparse. There exist three studies analyzing the effectiveness of state-sponsored fiscal bonus programs for teachers.

Clotfleter, Glennie, Ladd, and Vigdor (2008) used surveys to analyze a bonus program for teachers in North Carolina. From 2001 through 2004, North Carolina offered a yearly \$1,800 bonus program for certified math, science, and special education teachers working in low-income and low-performing schools. The bonus program was designed to recruit and/or retain new and current teachers certified in math, science, and special education to teach in disadvantaged middle and high schools.

Analysis by Clotfleter et al. indicated district personnel charged with administering the bonus program gave little attention to the impact of the bonus on recruitment of new teachers. Instead, the focus in the bonus program was directed on the retention of current teachers working in eligible schools. Survey data collected from school principals and teachers affected by the program indicated the differential of \$1,800 annually was not sufficient to reduce turnover in the low-performing and/or high-poverty schools. The state legislature canceled the bonus program before any long-term effects could be estimated. Clotfleter et al. reported weak and confusing implementation of the policy undermined its potential effects.

Qualitative studies by Liu, Moore, and Peske (2004) and McDermott (2005) evaluated the effectiveness of the Massachusetts Signing Bonus Program (MSBP) enacted in 1998. The unprecedented size of the signing bonus, \$20,000 dispersed over four years, was coupled with an accelerated alternative certification program for a group of teacher candidates considered to be highly qualified.¹⁶ The intent of the signing bonus was to create incentives to “encourage high achieving candidates to enter the profession who would otherwise not consider a career in teaching” (Massachusetts State Legislature, 1998).

Both Liu et al. and McDermott showed while the amount of the signing bonus did attract nearly 4,000 candidates from diverse professions over the four years it was offered, the bonus payments had little influence on the teacher recipients’ decision to enter teaching. It was the accelerated alternative certification program that was the most influential factor attracting the teacher recipients from other professions to teaching.

Summary

¹⁶ Candidates for MSBP included individuals with or without a teacher license but excluded candidates with public school teaching experience.

A review of the research literature reveals very little is known about nontraditional teachers. Variations in the definition of “nontraditional,” in addition to a lack of consistent and reliable data, have hampered efforts to answer the most basic questions about nontraditional teachers. To date, findings from large-scale studies of alternatively certified teachers, coupled with the few existing studies of subgroups of nontraditional teachers, suggest assumptions of nontraditional teachers are accurate: a larger percentage of nontraditional teachers are male, minority, and older and have higher academic qualifications as compared to their traditional counterparts.

Recent advancements in data collection are contributing to a growing body of research on the effectiveness of various subgroups of nontraditional teachers as measured by student academic outcomes. While some studies show the quality of nontraditional teachers is less than that of traditional teachers, findings from other studies are contradictory. Rigorous research of alternatively certified teachers, including TFA and NYCTF members, suggests many nontraditional teachers are as effective, if not more effective, as new and experienced traditionally prepared teachers.

Although a large body of research concludes teacher candidates respond to wages when making occupational choices, the higher across-the-board wages many districts have offered failed to recruit enough qualified teachers. Staffing shortages persist in high-need schools and subjects. Mounting political pressure to improve teacher quality in high-needs schools and subjects has spurred policymakers to experiment with a variety of fiscal incentive strategies designed to recruit high-quality nontraditional and traditional teachers, despite a lack of evidence such policies are effective.

If policymakers are to craft effective and efficient recruiting and fiscal incentive strategies, rigorous empirical analysis is needed to answer essential questions regarding the effectiveness of these policies. How many nontraditional teachers are employed in K-12 public school districts and what their characteristics? How many public K-12 school districts offer fiscal recruitment incentives and what are the characteristics of these districts? What types of teachers are district fiscal recruitment policies attracting? If a district uses fiscal incentives, is it more likely to recruit a different mix of teachers than when not using fiscal incentives? What is the dollar amount of financial reward districts are using to recruit teachers to hard-to-staff subjects? The next chapter begins to answer these questions using descriptive statistics to create

a quantitative profile of nontraditional teachers and districts with fiscal recruitment policies. Subsequent chapters describe the research questions and analysis used in this study to examine the types of teachers districts are recruiting with fiscal incentive policies and the dollar amount of these incentives.

CHAPTER III

Policy Background

Introduction

The inability of schools to staff classrooms with teachers who have subject matter expertise has increasingly been recognized by researchers and policymakers as a looming crisis. Increasingly, to solve the problem of a lack of teachers with skills and knowledge in subjects where chronic shortages persist, policymakers and practitioners are looking towards nontraditional teachers and teachers with a major in the field they instruct as a promising solution. Research indicates that teachers who have a major in their subject area elicit greater gains from students than do out-of-field teachers, controlling for the student's prior academic achievement and socioeconomic status (see Darling-Hammond, 2000; Hanushek, 1997; Sanders and Rivers, 1996). Nontraditional teachers are presumed to offer strong subject matter expertise and professional experiences that help connect the instructional process to real-life applications (Chambers, 2002; Dai, Sindelar, Denslow, Dewey and Rosenberg, 2007; Resta, Huling and Rainwater, 2001). They also may offer a pool of prospective teachers that is more ethnically and gender diverse than present enrollment patterns in undergraduate teacher education, which remain overwhelmingly white and female (Haselkorn and Hammerness, 2008).

Mounting pressure to recruit well-qualified professionals from fields outside of education with expertise in shortage fields, as well as better qualified traditional teachers, has policymakers pursuing a wide array of recruiting strategies and policy initiatives. Policies and programs to attract nontraditional teachers and high quality teachers have proliferated in recent years. Over the past decade, increasing numbers of public school districts have employed a variety of market-based teacher compensation strategies in efforts to increase the pool of qualified individuals entering the teacher labor market. One such strategy is pay differentials in the form of fiscal recruitment

incentives. These incentives are designed to recruit teacher candidates with in-demand knowledge and skills to the profession with the goal of improving teacher quality. They are also intended to overcome teachers' reluctance to work in hard-to-staff locations and alleviate chronic staffing shortages.

However, despite growth in districts' use of this type of recruitment strategy, a review of relevant research indicates little is known about the effects of financial incentives on the recruitment of teachers. Many essential questions should be answered if policymakers are going to continue funding this type of recruitment strategies. What types of districts utilize economic recruitment incentives? To which district recruitment strategies do teachers best respond?

These questions are answered with a descriptive analysis which first profiles nontraditional teachers, and then profiles districts using fiscal recruitment incentives. Data from the Schools and Staffing Survey (SASS) are used to examine descriptive statistics of first year, K-12 public school teachers and the school districts in which they work. The National Center for Education Statistics (NCES) administers the SASS at four-year intervals to a nationally representative sample of schools, districts, administrators, and teachers, both public and private. The data for this study was drawn from the 1990-1991, 1993-1994, 1999-2000 and 2003-2004 cycles of the SASS. There were approximately 43,000 to 47,000 teacher respondents and 4,000 to 5,000 district respondents for each cycle of the survey.

Analysis begins with a profile of first year, nontraditional teachers, identifying their characteristics and the characteristics of the districts in which they work. Limitations of SASS prevent analysis of veteran, nontraditional teachers. Unless stated, all nontraditional teachers in this study are new entrants to the teaching profession. Comparative analysis describes the frequency of nontraditional teacher in the workforce. Then, a profile of districts describes the types of districts that use fiscal recruitment incentives targeting hard-to-staff subjects and locations. The last section examines similarities between schools' difficulty in filling teacher vacancies for hard-to-staff subjects and locations and districts' economic incentives for recruiting teachers.

A Profile of Nontraditional, First Year Teachers

The subjects of this descriptive profile are first year, K-12 public school teachers classified into three teacher types: nontraditional, ambiguous, and traditional. Though the focus of this study is describing a profile of nontraditional teachers, a comparison of first year nontraditional teachers

to other first year teacher types reveals variations in the characteristics of nontraditional teachers that make them unique. Table 1 describes the three types of first year teachers that are examined in this profile. As indicated in Table 1, the teachers' bachelor major and their activity before becoming a first year teacher determined to which group they were assigned.¹⁷ The sample excludes teachers with experience teaching part-time in K-12 public schools other than as a substitute teacher and those with experience teaching in private schools.

Table 1
First Year Teacher Types

Nontraditional	Ambiguous	Traditional
Bachelor = Not education	Bachelor = Not education	Bachelor = Education
Activity last year: 1) job outside education 2) military 3) retired	Activity last year: 1) college student 2) caring for family 3) teaching at university 4) unemployed 5) substitute/other	Activity last year: 1) college student 2) caring for family 3) teaching at university 4) unemployed 5) substitute/other 6) job outside education 7) military 8) retired

For this study, a nontraditional teacher is defined as having a bachelor major in a subject other than education in addition to working in a field that is not related to education. The sample of nontraditional teachers is limited to individuals who worked in an occupation outside of education, retirees, or midcareer professionals or career changers. Nontraditional teachers are assumed to have expertise in their field because they have majored in it and are likely to have been working in that field.

Although the sample of nontraditional teachers is limited to individuals who appear to have worked in profession before becoming a teacher, it is possible that the duration of work experience outside the field of education is quite small. One limitation of the SASS is that it does not

¹⁷ “What was your bachelor major?” was the question answered by teacher respondents for all four cycles of the SASS included in this research. “What was your activity last year?” was the question answered by teacher respondents for the 1999-2000 and 2003-2004 cycles and “What was your activity prior to your first year of teacher?” was the question responded to by teachers for the 1993-1994 and 1990-1991 cycles.

specifically ask respondents how long they worked at their profession prior to entering teaching. A nontraditional teacher may have indicated that prior to becoming a first year teacher he worked in an occupation outside the field of education. The duration of that work may be any amount of time, thereby making it difficult to determine whether a nontraditional teacher was indeed a career-changer.

Teachers included in the ambiguous category also have a bachelor major in a subject other than education. The differentiation between nontraditional and ambiguous teachers is found in what activity they were doing the year before becoming a teacher. The ambiguous teachers are those non-education majors who may have been planning to become a teacher but for some reason did not major in education. When looking at their activities last year it is unclear that they had a profession other than education in mind as a career path - hence the use of “ambiguous.” In contrast, nontraditional teachers appear to have had an intervening profession between graduation from college and teaching, indicating that they were not planning on teaching as their first profession.

Traditional teachers, for this research, are those individuals who indicated by their choice of an education major that they clearly intended on becoming a teacher. For various reasons, some of them did not enter teaching directly from college. However, because they have a bachelor major in education, they are considered to be a traditional supply source for teachers.

Frequency of Nontraditional, First Year Teachers in the Teacher Labor Market

Since 1990, the percentage of nontraditional teachers recruited to teaching in public schools has more than doubled from 6.3% to 13.8% (see Table 2). During this same time period the percentage of teachers categorized as ambiguous has almost doubled from 25.4% to 43.5% and the percentage of traditional teachers has decreased by approximately 26 percentage points.

The trend of increasing numbers of nontraditional teachers coincides with the substantial expansion of policy initiatives aimed at recruiting career changers, retirees and military personnel. The interest in attracting nontraditional teacher candidates to education first garnered substantial attention in the mid-1980's and early 1990's. During those years, a number of influential national reports called for the profession to tap the pool of potential career changers, retirees and military personnel as teachers (Haselkorn et al., 2008). Accordingly, there has been and continues to be large increases of policy initiatives aimed at recruiting nontraditional teachers. Whether or not

recruitment policies can be directly linked to the steady increase of nontraditional teachers cannot be confirmed with data from the SASS as none of the survey questions ask the respondents their rationale for entering teaching.

Table 2
Incidence of First Year Teacher Type

	2003-2004		1999-2000		1993-1994		1990-1991	
Teacher Type	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *
Nontraditional	207	13.8	149	9.7	157	6.8	111	6.3
Ambiguous	751	43.5	604	35.0	621	31.7	428	25.4
Traditional	545	42.7	872	55.3	1,211	61.5	1,209	68.3
TOTAL	1,503	100	1,625	100	1,989	100	1,748	100

Source: Schools and Staffing Survey, various years. Public Teacher Survey

* Weighted percents

Characteristics of Nontraditional, First Year Teachers

Because nontraditional teachers are widely believed to be drawn from professions outside of education as career changers, one would expect nontraditional teachers to be predominately older than traditional teachers, likely to have a higher level of education, be male, and have expertise in a content area that would be best matched with teaching at the secondary level. Descriptive data analysis of the characteristics of nontraditional teachers presented in Table 3 confirms most of these assumptions.

Across the four SASS cycles there is substantial variation among the age distribution of nontraditional teachers. The variation is not surprising as there is no “expected” entry point into teaching as there is with a large percentage of traditional teachers who enter teaching upon graduation from college. On average, approximately 75% of traditional teachers are in their 20’s, leaving only 25% percent in all other age groups. This pattern is also consistent with ambiguous teachers. Given the operational definition of nontraditional teachers used in this study, it is likely that nontraditional teachers would have more individuals in the older age groups as many of

these teachers enter teaching as second careers or as career changers. Indeed, on average, 61% of nontraditional teachers are clustered in the 30, 40 and 50 age groups.

The trend over the four cycles of the SASS indicated that on average, approximately 48% of nontraditional teachers are male as compared to an average of 22% of traditional teachers. Considering the profession's historical gender composition of predominately women, it is expected that a larger proportion of traditional teachers would be female. The likelihood of more men categorized as nontraditional teachers could be attributed to the many recruitment strategies and program initiatives designed to attract men to teaching. Another possibility is that fiscal incentives utilized by districts are in fact attracting more male nontraditional teachers.¹⁸

Patterns in the school level data show that nontraditional teachers are more likely to be teaching on the secondary level. This is particularly evident in 2003-2004 where the ratio of nontraditional teachers working at the elementary level as opposed to the secondary level is 1 to 3. One explanation for this pattern is that females have historically been concentrated at the elementary level, and given that approximately 50% of this sample of nontraditional teachers is male, it is to be expected that a greater proportion of nontraditional teachers would be found working at the secondary level. Another explanation for this pattern is that most subjects experiencing chronic shortages of qualified teachers (math, science, and foreign language) are instructed predominately on the secondary level. If nontraditional teachers are in fact responding to recruitment strategies aiming to recruit qualified teachers to work in subject shortage areas, then it is likely there would be more nontraditional teachers at the secondary level.

Recruitment strategies may also be the source of the increase in the percentage of minority teachers in the nontraditional teacher category. Many recruitment strategies are designed to attract minority teachers to hard-to-staff locations and subjects and research has indicated that minority teachers are more likely to teach in hard-to-staff urban schools than are nonminority teachers. Apart from 1990-1991, all other cycles of the survey show that approximately 30% to 40% of nontraditional teachers are minorities. In comparison, only 14 % to 16% of traditional teachers are minorities and 16% to 22% of ambiguous teachers are minorities. Stated another way, looking within years of 2003-2004, 1999-2000, and 1993-1994, a first year minority teacher is 2 to 3 times more likely to be a nontraditional teacher rather than a traditional teacher.

¹⁸ Research by Han et al. (2004) suggests that men are more motivated by pecuniary factors than are women.

The percentage of nontraditional and ambiguous teachers that have a master's degree is much larger than the percentage of traditional teachers with a master's degree for all four cycles of the SASS. This could be contributed to the large percentages of nontraditional and ambiguous teachers that are older; these teachers have had more years to earn a master's degree than have traditional teachers who are predominately younger.

Looking at the teaching assignments variable in the four cycles of SASS, several trends within and across the three teacher types are apparent. Within each teacher type category, the percentages of each teacher type instructing in the shortage fields of foreign language, ESL and special education are relatively consistent over time. The most dramatic variation is found in math and science. Looking within each year of the survey other than 1999-2000, nontraditional teachers are approximately 3 times more likely to be teaching the hard-to-staff subjects of math and science than traditional teachers. For each year of the survey, approximately 10% of traditional teachers are instructing math or science. This consistency is not found within the teacher types of nontraditional and ambiguous teachers. The percentages of nontraditional math or science teachers for each year vary between 14% and 33%. For the ambiguous category, the percentages of math and science teachers vary between 14% and 24%.

What is not clear are the reasons for and the sources of both the increase in percentage of nontraditional teachers in the fields of math and science over time, and the increase in the number of nontraditional teachers teaching math and science as compared to traditional teachers and ambiguous teachers over time. Also unclear is why low percentages of nontraditional teachers are represented in the hard-to-staff subjects of foreign language and ESL. Again, many recruiting strategies target nontraditional teachers who are qualified to teach in subject-shortage areas. It could be that the recruiting strategies are working for math and science and not working for foreign language and ESL. Limitations of the SASS prevent a concrete analysis of the relationship between incentives and an individual's choice for entering teaching. However, data from the SASS district survey aids in compiling a more complete profile of nontraditional teachers.

Table 3
Characteristics of First Year Teachers by Teacher Type

Teacher Characteristics	2003-2004			1999-2000			1993-1994			1990-1991		
	Teacher Type			Teacher Type			Teacher Type			Teacher Type		
	Nontrad.	Ambig.	Trad.	Nontrad.	Ambig.	Trad.	Nontrad.	Ambig.	Trad.	Nontrad.	Ambig.	Trad.
Gender	Percent *			Percent *			Percent *			Percent *		
Male	43.9	27.1	18.2	46.3	28.6	19.9	52.9	37.4	29.6	49.1	25.6	20.7
Race	Percent *			Percent *			Percent *			Percent *		
Minority	34.1	21.8	15.9	29.8	18.9	16.3	40.3	15.7	13.5	16.8	17.1	14.7
School Level												
Elementary	25.0	34.3	70.6	46.9	40.5	61.9	28.2	40.3	59.8	42.0	44.9	69.7
Secondary	75.0	65.2	29.4	53.1	59.5	38.1	71.8	59.7	40.2	58.0	55.1	30.3
Master's Degree	Percent *			Percent *			Percent *			Percent *		
Yes	23.9	23.6	4.7	33.5	26.9	6.7	19.5	21.3	7.0	32.4	16.8	5.8
Union Member												
Yes	51.3	68.2	68.4	61.9	75.3	68.0	n/a	n/a	n/a	n/a	n/a	n/a
Age Group	Percent *			Percent *			Percent *			Percent *		
20s	42.1	64.9	76.3	42.3	69.9	74.4	30.6	54.4	67.6	35.3	60.9	63.7
30s	31.1	22.4	13.1	28.9	18.4	15.5	37.2	25.6	18.3	37.1	30.8	23.9
40s	19.5	7.3	9.9	15.3	8.8	7.9	24.8	17.0	11.9	24.3	6.4	10.2
50s	6.3	5.3	0.7	13.1	2.6	2.1	5.9	3.2	2.1	1.9	1.4	2.0
60s/70s	1.1	0.1	0.0	0.5	0.2	0.2	1.6	0.0	0.1	1.4	0.5	0.2
Reported Salary												
Average	\$31,536	\$31,240	\$29,378	\$29,084	\$28,761	\$26,318	\$23,962	\$23,265	\$21,916	\$22,389	\$21,354	\$20,166
Std. Deviation	\$7,189	\$6,179	\$5,179	\$5,234	\$5,211	\$5,486	\$6,226	\$5,019	\$5,117	\$5,765	\$4,819	\$4,277
Assignment	Percent *			Percent *			Percent *			Percent *		
Math	22.5	8.5	9.3	4.0	8.0	6.0	10.4	7.5	5.3	3.4	7.6	3.8
Science	11.2	10.8	3.0	9.8	15.9	3.3	13.2	11.1	2.3	15.4	7.0	2.4
Foreign Lang.	0.9	4.2	0.6	1.8	3.6	2.0	4.2	4.9	1.2	1.8	10.5	0.8
ESL/Bilingual	1.4	2.9	0.0	0.5	0.5	0.35	13.5	2.0	1.8	4.1	3.4	1.8
Special Ed	16.2	7.9	17.5	13.8	7.6	12.8	10.7	5.9	11.9	10.6	7.9	13.4
Elementary	5.8	21.0	51.4	28.7	29.9	43.3	20.4	39.4	54.7	40.9	44.7	58.3
n	207	751	545	149	604	872	157	621	1,211	111	428	1,209

Source: Schools and Staffing Survey, various years. Public Teacher Survey.

*Weighted percents

Districts in Which Nontraditional, First Year Teachers Work

The SASS data for the district and teacher surveys were merged for this analysis in order to match teachers with the districts in which they work. Teachers without a matching district were excluded from the sample. There were approximately 42,000 teachers matched with their districts for each of the four SASS cycles.

Analysis of the districts in which nontraditional teachers are working provides insight into the type of district that is successfully attracting nontraditional teachers and conversely, the type of district that is not. As presented in Table 4, a larger percentage of nontraditional teachers and ambiguous teachers are working in urban schools than traditional teachers for each cycle of the SASS survey. In 2003-2004, the difference between the percentage of nontraditional teachers (54.1%) and traditional teachers (20.5%) working in urban districts is most pronounced. For all years of the survey apart from 1990-1991, the percentage of traditional teachers is highest in suburban districts. Over time, the percentage of nontraditional teachers working in urban districts increases, rising from 31.7% in 1990-1991 to 54.1% in 2003-2004.

A large percentage of nontraditional teachers are teaching in districts with a high percentage of minority students. Between 1990-1991 and 2003-2004, the percentage of nontraditional teachers working in high minority districts more than doubled from 33.7% to 68.4%. For 1993-1994, 1999-2000 and 2003-2004, the percentage of nontraditional teachers working in high minority districts is approximately twice as large as traditional teachers. These high minority school districts also employ a larger percentage of ambiguous teachers than traditional teachers.

High poverty districts, as measured by students eligible for free and reduced price lunch, have a greater percentage of nontraditional teachers than traditional or ambiguous teachers. Within the category of nontraditional teachers the most dramatic variation is found in 2003-2004 and 1993-1994. For each of these cycles, the difference between the percentages of nontraditional teachers working in high poverty districts versus low poverty districts is 39%. Moreover, for these same cycles, the difference between the percentages of nontraditional teachers working in high poverty districts versus traditional teachers is approximately 20%. The 1999-2000 survey shows almost no variation across the percentages of each teacher type category working in high poverty districts as well as within each teacher type category.

Table 4
District Characteristics by First Year Teacher Type

District Characteristics	2003-2004			1999-2000			1993-1994			1990-1991		
	Teacher Type			Teacher Type			Teacher Type			Teacher Type		
	Nontrad.	Ambig.	Trad.	Nontrad.	Ambig.	Trad.	Nontrad.	Ambig.	Trad.	Nontrad.	Ambig.	Trad.
Salary Schedule	Percent *			Percent *			Percent *			Percent *		
Yes	98.8	98.0	98.4	99.5	99.1	99.3	99.5	99.5	98.7	100	99.7	98.7
Yes-Salary Schedule: Starting Salary												
Bachelor's -No Exper.	\$30,507	\$30,253	\$29,051	\$27,315	\$27,308	\$25,821	\$22,726	\$22,408	\$21,695	\$21,060	\$20,981	\$19,927
Std. Deviation	\$4,693	\$4,463	\$4,000	\$3,673	\$3,838	\$3,573	\$3,417	\$3,536	\$3,299	\$3,136	\$3,647	\$3,132
Masters -No Exper.	\$32,910	\$33,011	\$31,618	\$29,432	\$29,895	\$28,318	\$24,664	\$24,497	\$23,823	\$23,239	\$22,952	\$21,891
Std. Deviation	\$5,472	\$4,985	\$5,234	\$3,851	\$4,246	\$3,941	\$3,819	\$4,005	\$3,769	\$3,656	\$4,048	\$3,639
% Minority ***	Percent *			Percent *			Percent *			Percent *		
High	68.4	48.1	30.7	51.7	43.3	28.3	60.5	34.2	28.4	33.7	28.2	20.8
Medium	16.7	18.0	21.7	24.7	18.8	20.5	20.4	24.6	20.2	18.9	19.0	19.4
Low	14.9	34.0	47.6	23.6	38.0	51.3	19.1	41.3	51.4	47.4	52.8	59.8
Location	Percent *			Percent *			Percent *			Percent *		
Urban	54.1	38.9	20.5	39.0	33.0	29.1	40.7	27.9	20.2	31.7	30.2	25.8
Rural	10.6	15.4	19.1	13.2	14.9	28.9	17.6	24.7	32.2	35.9	35.8	45.6
Suburban	35.3	46.0	60.4	47.9	52.3	42.1	41.7	47.4	47.6	32.4	34.7	28.6
% Free Lunch/Poverty	Percent *			Percent *			Percent *			Percent *		
High	53.9	44.0	32.9	37.0	33.9	34.0	56.4	37.0	36.8	n/a ****	n/a	n/a
Medium	31.1	34.1	44.9	36.2	29.7	38.1	19.8	32.8	34.0	n/a	n/a	n/a
Low	14.6	20.6	21.2	26.2	34.9	27.4	16.9	28.2	27.5	n/a	n/a	n/a
n	175	620	479	130	543	762	141	585	1,124	100	388	1,098

Source: Schools and Staffing Survey, various years. District and Public Teacher Surveys.

*Weighted percents

** District data merged with corresponding teacher data.

*** Minority and poverty percentages calculated as:

high = greater than 75%, medium = less than 75% and greater than 25%, and low = less than 25%.

****1990-1991 does not have a district variable measuring students eligible for free and reduced price lunch.

Summary

Data from SASS confirm important trends and patterns in the profile of nontraditional teachers:

- The number of nontraditional teachers is increasing over time.
- A large percentage of nontraditional teachers work in urban school districts and the percentage increases over time.
- Consistently, a greater percentage of nontraditional teachers work at the secondary level than the elementary level.
- Nontraditional teachers are generally older than traditional teachers.
- A large percentage of nontraditional teachers work in school districts with a high number of minority students and a high level of poverty.
- Nontraditional teachers are more highly educated than traditional teachers.
- On average, the percentage of nontraditional teacher instructing math and science is increasing over time.
- For three out of the four SASS cycles, nontraditional teachers are approximately 3 times more likely to be instructing math or science than traditional teachers.

Whether or not these trends and patterns are attributable to recruitment strategies targeting nontraditional teachers to hard-to-staff locations that are urban, high minority or high poverty is uncertain. It is possible that recruitment incentives are influencing nontraditional teachers' choice of which district they will work. An alternate explanation is that urban districts have access to different labor markets than do suburban or rural districts. Hence, the characteristics of the teachers working in urban districts differ from those working in other types of districts. Descriptive analysis of nontraditional teachers cannot confirm either of these possibilities.

A more complex data analysis is needed to gain a better understanding of how nontraditional teachers are responding to district fiscal recruitment policies. The next phase of this research will examine the impact these recruitment policies are having on the teacher workforce, particularly nontraditional teachers.

A Profile of Districts with Fiscal Recruitment Incentive Policies

Descriptive statistical analysis examines the relationship between districts' use of fiscal recruitment incentives and the key variables of subject shortage areas and hard-to-staff locations. Subject shortage areas are also referred to as hard-to-staff subjects because they are curricular areas districts and their schools find difficult to staff due to a lack of qualified teachers. Recent empirical research identifies math, science, foreign language, special education, vocational technology, and English as a Second Language (ESL)/bilingual education as subject shortage areas.

Hard-to-staff locations are recognized in research as districts in urban or rural settings. Historically, staffing in these district locations is more difficult than in suburban areas due to challenges posed by high concentrations of economically disadvantaged and minority students. Using a National Center for Education Statistics classification system, districts in this study are separated into the location categories of urban, suburban, or rural. Each location category will be analyzed in conjunction with two demographic variables associated with hard-to-staff locations: percentage of minority students and percentage of students in poverty as measured by free and reduced price lunch.

Frequency of Districts with Fiscal Recruitment Incentive Policies

Results from the SASS indicate a longitudinal trend of districts offering a greater proportion of economic incentives for recruiting teachers to subject shortage areas (12%; n=2286) than to hard-to-staff locations (6.2%; n=1177). As indicated in Table 5, district fiscal recruitment incentives for subject shortage fields increased with each consecutive survey year from 1990 to 2004, accounting for a cumulative gain of 208 districts. In comparison, districts recruiting with fiscal incentives for hard-to-staff locations fluctuated over survey years, and by 2003-2004 districts were more than three times likely to offer fiscal recruitment incentives aimed at subject shortage areas than hard-to-staff locations.

In the sections that follow, fiscal recruitment incentives for subject shortage areas and hard-to-staff locations are analyzed separately to gain insight into characteristics related with the likelihood of districts offering either type of incentive. Next, they are examined together to identify district patterns for fiscal recruitment incentives targeting subject shortage areas in hard-to-staff locations.

Table 5
Incidence of District Fiscal Recruitment Incentives for
Subject Shortage Areas and Hard-to-Staff Locations

	2003-2004		1999-2000		1993-1994		1990-1991	
Incentives	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *
Subject Shortage Areas	657	11.9	607	10.4	573	10.2	449	8.7
Hard-to-Staff Locations	247	3.2	225	3.6	454	9.9	251	5.0
n	4,421		4,690		4,993		4,884	

Source: Schools and Staffing Survey, various years. Public School District Survey.

* Weighted percents

District Fiscal Recruitment Incentives for Subject Shortage Areas

The SASS asked districts to identify the subject shortage areas for which they offered fiscal recruitment incentives, permitting districts to select zero, one, or more than one subject shortage area. Results from this survey question indicate the number of districts providing fiscal recruitment incentives increased with each sequential SASS cycle for all hard-to-staff subjects apart from vocational technology (see Table 6).

Districts employing math fiscal recruitment incentives grew from 2.3% in 1990-1991 to 6.0% in 2003-2004, representing the subject shortage area with the largest longitudinal gains for such incentives. Vocational technology had the smallest growth rate for district fiscal recruitment incentives for hard-to-staff subjects, increasing from 1.5% to 2.6% during the same time period.

Foreign language was the subject shortage area garnering the smallest percentage of districts' economic recruitment incentives for all SASS years other than 2003-2004 when vocational technology ranked last. Receiving the largest proportion of these incentives for each SASS cycle was special education, followed by math.

Districts' preference for utilizing economic recruitment incentives for special education was evident throughout the fourteen-year period. For example, in survey year 1990-1991, districts were two to five times more likely to use economic incentives to recruit special education teachers than teachers of other hard-to-staff subjects. With each consecutive survey year, however, this

likelihood decreased as districts dedicated larger proportions of fiscal recruitment incentives to other subject shortage areas.

Table 6
Incidence of District Fiscal Recruitment Incentives for Subject Shortage Areas

	2003-2004		1999-2000		1993-1994		1990-1991	
Subject Shortage Areas	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *
Math	331	6.0	218	3.8	137	3.2	120	2.3
Science	260	4.6	194	3.6	129	2.7	97	2.0
Special Education	451	7.3	371	5.7	363	6.2	273	4.7
ESL/Bilingual Education	279	4.3	237	3.3	178	3.1	93	1.5
Foreign Language	196	3.8	147	2.4	98	2.1	54	0.9
Vocational Technology	153	2.6	189	3.5	142	2.5	81	1.5
n	4,421		4,690		4,993		4,884	

Source: Schools and Staffing Survey, various years. Public School District Survey.

* Weighted percents

District Fiscal Recruitment Incentives for Hard-to-Staff Locations

Empirical research suggests districts in urban or rural locations and districts with high concentrations of minority and economically disadvantaged students experience greater staffing challenges than those without such characteristics. Influences of these characteristics on districts' use of economic recruitment incentives are discussed below and displayed in Table 7.

Each district was categorized with a location variable of urban, suburban, or rural to identify patterns in districts' use of economic recruitment incentives associated with hard-to-staff locations. Analysis indicates urban and rural districts offered larger proportions of fiscal incentives to recruit teachers than suburban districts for all SASS cycles apart from 2003-2004. During the 2003-2004 SASS, suburban districts' usage of these incentives outpaced rural districts but not districts in urban locations. Districts in all three location categories offered their largest proportions of fiscal recruitment incentives in SASS cycle 1993-1994. These proportions significantly decelerated in survey year 1999-2000 by more than fifty percent for districts in all locations. Rural districts

experienced the largest decreases from 11.2% in 1993-1994 to 3.6% in 1999-2000, and continued dropping to just 2.4% by 2003-2004.

Districts' percentages of minority and economically disadvantaged students were classified into three levels: low (25% or less), medium (greater than 25% and less than 75%), or high (75% or greater). Only survey years 1993-1994 through 2003-2004 are included in the analysis of students in poverty as SASS did not include this measurement in the 1990-1991 survey.

Trend data shows percentages of districts offering fiscal recruitment incentives increased in conjunction with rising levels of minority and economically disadvantaged students for all SASS cycles. High minority and high poverty districts were two to five times more likely than low minority and low poverty districts to offer economic recruitment incentives during 1990-1991 and 1993-1994, and nearly four times as likely for survey cycles 1999-2000 and 2003-2004.

Districts with all levels of minority and poverty students reported offering their largest proportions of economic recruitment incentives during SASS cycle 1993-1994. By 1999-2000, these proportions reduced by nearly two-thirds. Low minority and low poverty districts' use of economic recruitment incentives continued to decline dramatically, and in 2003-2004, they offered these incentives at a rate approximately five times lower than in 1993-1994.

Table 7
Incidence of District Fiscal Recruitment Incentives for Hard-to-Staff Locations

	2003-2004		1999-2000		1993-1994		1990-1991	
Hard-to-Staff Locations	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *
Urban	48	4.6	40	5.0	38	11.1	22	4.8
Suburban	117	3.8	74	3.4	140	8.0	75	3.8
Rural	82	2.4	111	3.6	276	11.2	154	5.8
High % Minority	124	8.4	92	9.3	106	18.5	65	11.0
Medium % Minority	57	5.0	43	4.5	76	11.3	43	5.8
Low % Minority	66	1.5	90	2.4	269	8.5	143	4.1
High % Poverty	118	5.2	96	5.1	203	14.3	n/a	
Medium % Poverty	98	3.4	80	3.7	141	10.6	n/a	
Low % Poverty	25	1.3	44	2.3	95	6.3	n/a	
n	4,421		4,690		4,993		4,884	

Source: Schools and Staffing Survey, various years. Public District Survey.

* Weighted percents

District Fiscal Recruitment Incentives for Subject Shortage Areas in Hard-to-Staff Locations

Analysis examines the relationship between districts in hard-to-staff locations and their use of fiscal incentives to attract teachers of subject shortage areas. Findings revealed several patterns: 1) urban districts dedicated larger shares of economic incentives to attract teachers of subject shortage areas than districts in suburban or rural regions for each SASS cycle; and 2) high poverty or high minority districts offered larger proportions of these incentives than districts with medium and low levels of minority and economically disadvantaged students for 1993 through 2004. What follows is a detailed discussion of each of these findings.

Table 8 shows districts in urban areas were nearly twice as likely as rural districts, and more than one and half times as likely as suburban districts to offer subject shortage area incentives in 2003-2004. Such a gap is notable when considering in 1990-1991, the incidence of districts in all three location categories using economic recruitment incentives to target teachers in any hard-to-

staff subject was approximately 9%. Data trends from 1990 to 2004 show modest overall increases in the proportions of suburban and rural districts offering fiscal recruitment incentives for hard-to-staff subjects, approximately three percentage points and one percentage point respectively. In comparison, the growth rate for urban districts' use of these incentives was eleven percentage points over the fourteen-year period of SASS.

Special education was the hard-to-staff subject to which districts in all three location categories committed their largest share of economic recruitment incentives for all four SASS cycles. Urban districts were nearly two to three times more likely than suburban and rural districts to offer such incentives for the ten-year period between 1993-1994 and 2003-2004. Longitudinal growth in proportions of districts utilizing special education fiscal recruitment incentives was evident in all locations, although growth was marginal for rural districts. Urban districts' usage more than doubled from 7.2% in 1990-1991 to 14.8% in 2003-2004, reaching a peak of 16.3% in 1993-1994. The overall growth rate for suburban districts employing such incentives was steady, increasing from 4.8% to 7.8% during the same time span. Survey results from rural districts showed less than one percentage point increase over the fourteen-year period for fiscal recruitment incentives targeting special education teachers.

Following special education, the most commonly offered economic recruitment incentives for hard-to-staff subjects varied according to district location. Urban and suburban districts reported math and ESL/bilingual education as the second or third most frequently incentivized subject shortage area while rural districts identified math and science. In sharp contrast to urban and suburban districts, rural districts ranked ESL/bilingual education as one of the least offered fiscal recruitment incentives.

Noteworthy longitudinal growth in math fiscal recruitment incentives was evident for the three district location categories, with urban districts experiencing the largest growth. Percentages of urban districts providing this type of incentive more than tripled from 2.8% in 1990-1991 to 10.1% in 2003-2004. During the same time period, nearly a threefold increase in the proportion of suburban districts using such incentives was evident (2.2% to 6.0%) while rural districts' usage more than double (2.4% to 5.0%).

Table 8
Incidence of District Fiscal Recruitment Incentives for Subject Shortage Areas by District Locations

Subject Shortage Areas	2003-2004			1999-2000			1993-1994			1990-1991		
	Location			Location			Location			Location		
	Percent *			Percent *			Percent *			Percent *		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Any Subject Shortage Area	20.9	12.1	9.9	15.2	9.3	10.7	20.1	9.9	9.8	9.6	8.9	8.6
Math	10.1	6.0	5.0	6.3	3.4	3.8	3.3	2.4	3.8	2.8	2.2	2.4
Science	6.7	4.7	4.1	5.9	2.7	4.0	3.0	1.9	3.4	2.2	1.6	2.2
Special Education	14.8	7.8	5.3	10.8	5.7	5.1	16.2	5.8	5.7	7.2	4.8	4.5
ESL/Bilingual Education	8.1	5.5	2.4	9.6	3.6	2.5	11.0	3.8	2.2	5.9	2.2	0.8
Foreign Language	6.4	3.9	3.2	3.9	2.0	2.6	1.2	1.6	2.4	0.3	1.1	0.8
Vocational Technology	1.8	2.4	3.0	2.6	2.4	4.4	3.0	2.3	2.7	2.0	1.4	1.5
n	537	1954	1930	514	1754	2422	385	1893	2715	383	1785	2716

Source: Schools and Staffing Survey, various years. Public School District Survey.

* Weighted percents

A review of SASS data 1990 through 2004 indicates a district's use of fiscal recruitment incentives for hard-to-staff subjects grew as the district's level of minority and poverty students increased. Table 9 indicates districts with high percentages of minority students were nearly three times more likely to offer fiscal recruitment incentives for hard-to-staff subjects than districts with low percentages of minority students, and outpaced medium minority districts' usage each survey year.

Proportions of medium minority districts using economic recruitment incentives targeted at hard-to-staff subjects increased steadily with each SASS cycle. The longitudinal increase in the use of these incentives by medium minority districts was nearly 8 percentage points over the fourteen-year period. In contrast, the growth rate for low minority districts was comparatively small at 0.2 percentage points from 1990 to 2004 while high minority districts was 3 percentage points. Despite relatively large increases in the proportions of fiscal incentives offered by medium minority districts for hard-to-staff subjects, high minority districts consistently utilized larger percentages of these incentives.

Special education was the subject shortage area to which districts with all levels of minority students dedicated their largest proportions of fiscal recruitment incentives for all survey years apart from 1999-2000. High minority districts offered the largest proportions of economic incentives to attract special education teachers, outpacing low minority districts by approximately three to one for all SASS cycles. In 1999-2000, districts with high levels of minority students targeted math teachers with their largest percentages of fiscal recruitment incentives (31.7%), a proportion nearly 2.5 times greater than fiscal incentives they used for recruiting special education teachers (13.1%). A similar pattern was found for districts with medium levels of minority students in the same survey year- math teachers were twice as likely to be offered fiscal recruitment incentives than were special education teachers.

In addition to targeting special education and math teachers with fiscal recruitment incentives, low-level minority districts consistently showed a preference for offering these incentives to science teachers for all SASS cycles other than 1999-2000. In survey year 1999-2000, economic incentives for recruiting vocational technology teachers outpaced those for both math and science teachers. ESL/bilingual education was the subject shortage area to which districts with low levels of minority districts committed their smallest proportions of this type of incentives during the fourteen-year period. In contrast, high and medium minority districts reported ESL/bilingual

education as one of the top three subject shortage areas garnering the largest proportions of their fiscal recruitment incentives for all survey years.

Table 9
Incidence of District Fiscal Recruitment Incentives for Subject Shortage Areas by District Percentage of Minority Students

	2003-2004			1999-2000			1993-1994			1990-1991		
	Percent Minority*			Percent Minority*			Percent Minority*			Percent Minority*		
Subject Shortage Areas	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low
Any Subject Shortage Area	21.6	18.0	7.8	20.4	14.5	7.8	24.7	12.4	8.0	18.6	10.1	7.3
Math	11.3	9.2	3.8	31.7	15.6	2.7	7.9	2.7	2.7	3.7	2.6	2.1
Science	7.2	6.8	3.4	6.7	4.0	3.0	5.9	2.6	2.4	3.7	2.1	1.8
Special Education	15.0	9.8	4.7	13.1	7.2	4.0	13.8	7.0	5.0	10.0	6.9	3.7
ESL/Bilingual Education	10.7	7.2	2.0	12.9	5.2	1.3	13.2	5.6	1.5	9.2	2.7	0.4
Foreign Language	5.9	5.4	2.9	4.3	2.6	2.1	3.4	2.2	1.9	1.2	1.0	0.9
Vocational Technology	3.4	4.1	2.1	4.0	5.0	3.2	3.8	2.8	2.3	1.9	2.6	1.3
n	927	784	2710	842	769	3079	705	820	3451	638	719	3527

Source: Schools and Staffing Survey, various years. Public School District Survey.

* Weighted percents

Effects of districts' levels of economically disadvantaged students on their use of fiscal recruitment incentives for hard-to-staff subjects are displayed in Table 10 for SASS cycles 1993 through 2004. For each SASS cycle, high poverty districts were twice as likely as districts with low levels of poverty to offer fiscal recruitment incentives for subject shortage areas. Districts with medium levels of economically disadvantaged students consistently used these incentives at proportions lower than high poverty districts and higher than low poverty districts. These findings were similar to results from analysis of districts with various levels of minority students and their usage patterns of economic recruitment incentives.

Longitudinal gains in districts' use of fiscal recruitment incentives for hard-to-staff subjects from 1993 through 2004 were modest for each level of poverty, particularly when compared to gains for districts with varying levels of minority students. Medium poverty districts' 1.2 percentage points of growth was the largest of the three poverty levels, although relatively small in comparison to the 5.6 percentage point growth for medium minority districts for the same time period. High poverty districts growth of 0.5 percentage points for these incentives was marginal, and only slightly larger than the 0.3 percentage point gain for low poverty districts.

The hard-to-staff subject targeted with the largest proportions of economic recruitment incentives by districts in all three levels of poverty was special education for SASS years 1993 through 2004 with one exception- low poverty districts offered slightly more fiscal recruitment incentives for math (4.2%) than special education (4.1%) in 2003-2004. Data patterns for special education show high poverty districts were more likely to utilize fiscal incentives for recruiting teachers to this subject shortage area than low poverty districts by a ratio of approximately 2.5 to 1.

Noteworthy longitudinal growth in use of fiscal recruitment incentives targeting math and foreign language was evident for districts with low levels of economically disadvantaged students. From 1993-1994 to 2003-2004, these districts more than tripled their use of fiscal recruitment incentives in foreign language (1.0% to 3.4%) and more than doubled their use of this type of incentive for math (1.8% to 4.2%). However, despite such gains, smaller percentages of low poverty districts offered fiscal recruitment incentives for these subject shortage areas than medium or high poverty districts.

Table 10
Incidence of District Fiscal Recruitment Incentives for Subject Shortage Areas by District Percentage of Students in Poverty

	2003-2004			1999-2000			1993-1994			1990-1991		
	Percent Poverty*			Percent Poverty*			Percent Poverty*			Percent Poverty*		
Subject Shortage Areas	High	Medium	Low	High	Medium	Low	High	Medium	Low	High	Medium	Low
Any Subject Shortage Area	15.7	11.5	7.7	14.2	11.8	7.0	15.2	10.3	7.4	n/a	n/a	n/a
Math	8.0	5.9	4.2	5.4	3.8	2.9	6.0	2.9	1.8			
Science	5.7	5.0	3.3	4.1	3.8	3.2	5.0	2.8	1.5			
Special Education	11.0	7.4	4.1	8.4	6.2	3.5	9.8	5.8	4.1			
ESL/Bilingual Education	6.8	4.6	1.8	6.3	3.5	1.3	6.1	3.0	1.5			
Foreign Language	4.2	4.1	3.4	3.1	2.8	1.8	3.8	2.0	1.0			
Vocational Technology	2.6	3.0	2.5	3.8	4.2	3.0	4.2	2.3	1.9			
n	1443	1691	1155	1395	1779	1432	1631	1602	1554			

Source: Schools and Staffing Survey, various years. Public School District Survey.

* Weighted percents

School Staffing Difficulties for Subject Shortage Areas

The SASS asked public schools whether they experienced problems with staffing teachers, and if so, to rate the difficulty of filling teaching vacancies for subject shortage areas.¹⁹ In this section, schools' responses are analyzed to identify notable similarities between subject shortage areas schools surveyed as being difficult to staff and those districts targeted with fiscal recruitment incentives.

Schools reported the top three subject shortage areas for which staffing was "very difficult" or "could not fill" were special education, math, or foreign language for all SASS survey years aside from 2003-2004 (see Table 11). In SASS cycle 2003-2004, science slightly outpaced foreign language by 0.2 percentage points as one of the most difficult subjects to staff. Survey responses were similar for districts as they reported special education and math as the top two subject shortages areas receiving their largest proportions of fiscal recruitment incentives for each survey year.

Percentages of schools reporting staffing challenges in math and proportions of districts offering fiscal incentives aimed at recruiting math teachers nearly tripled from 1990-1991 to 2003-2004, although their pace of growth differed. For survey years 1990-1991 through 1999-2000, just 5% of schools, on average, reported staffing to be "very difficult" or "could not fill" for math. But, in survey year 2003-2004, this percentage jumped to 13.7%. Growth in the proportions of districts offering math fiscal incentives was steady, increasing from 2.3% to 6.0% over the four SASS cycles with no notable spikes from one survey cycle to the next.

Divergent patterns were reported between schools' staffing challenges and district fiscal recruitment incentives for foreign language. Although foreign language was consistently reported by schools as one of the most difficult shortage subject areas to staff for SASS years 1990 through 1999, districts reported offering their smallest share of fiscal recruitment incentives for this subject for the same survey years.

¹⁹ The SASS Public School survey questions read: "For this school year, were there teaching vacancies in the school, that is, teaching positions for which teachers were recruited and interviewed?" If the schools' response was yes, schools were asked "How easy or difficult was it to fill the vacancies in each of the following fields: General elementary, Special education, English/Language arts, Social studies, Computer science, Mathematics, Biology or life science, Physical science, ESL or bilingual education, Foreign languages, Music or art, and Vocational or technical education?" Responses included: "No positions or Not applicable in this school, No vacancy in this field, Easy, Somewhat difficult, Very difficult, and Could not fill the vacancy."

Table 11
Incidence of School Difficulty Filling Staffing Vacancies in Subject Shortage Areas

Difficulty Filling Staffing Vacancies In Subject Shortage Areas	2003-2004		1999-2000		1993-1994		1990-1991	
	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *
Math								
Not Applicable	2,079	57.3	2,752	61.4	2,754	62.1	2,752	61.4
Easy	563	12.6	1,049	21.5	1,008	21.0	1,049	21.5
Somewhat Difficult	728	16.4	552	12.2	555	11.9	552	12.2
Very Difficult	586	12.3	223	4.6	196	4.7	223	4.6
Could Not Fill Vacancy	54	1.4	11	0.3	13	0.3	11	0.3
Science								
Not Applicable	2,679	72.4	3,356	75.0	3,237	73.1	3,358	75.0
Easy	409	9.0	661	12.6	635	12.7	661	12.5
Somewhat Difficult	568	11.6	390	8.4	436	9.7	390	8.4
Very Difficult	333	6.6	169	3.6	199	4.2	169	3.6
Could Not Fill Vacancy	22	0.5	10	0.5	18	0.4	10	0.5
Special Education								
Not Applicable	2,053	60.7	2,728	62.1	2,704	64.0	2,728	62.1
Easy	486	11.0	703	14.7	759	15.4	703	14.7
Somewhat Difficult	788	16.1	616	12.1	701	13.6	616	12.1
Very Difficult	586	10.4	455	9.2	325	6.4	455	9.2
Could Not Fill Vacancy	97	1.8	85	1.9	37	0.6	85	1.8
n	4,010		4,587		4,526		4,587	

Source: Schools and Staffing Survey, various years. Public School Surveys.

*Weighted percents

Table 11 (continued)

Incidence of School Difficulty Filling Staffing Vacancies in Subject Shortage Areas

	2003-2004		1999-2000		1993-1994		1990-1991	
Difficulty Filling Staffing Vacancy In Subject Shortage Areas	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *	Frequency	Percent *
ESL/Bilingual Education								
Not Applicable	3,449	88.3	4,186	91.1	4,027	90.0	4,186	91.1
Easy	147	3.4	168	3.4	173	3.7	168	3.4
Somewhat Difficult	221	4.2	112	2.4	176	3.5	112	2.4
Very Difficult	173	3.8	106	2.7	134	2.5	106	2.7
Could Not Fill Vacancy	20	0.3	15	0.4	16	0.3	15	0.4
Foreign Language								
Not Applicable	2,759	74.7	3,411	75.6	3,313	75.4	3,411	75.6
Easy	321	7.3	513	10.3	464	9.2	513	10.3
Somewhat Difficult	508	9.6	356	7.3	437	8.8	356	7.3
Very Difficult	374	7.5	283	6.2	282	6.0	283	6.2
Could Not Fill Vacancy	48	0.9	24	0.6	30	0.6	24	0.6
Vocational Technical								
Not Applicable	2,944	76.9	3,304	74.1	3,954	89.0	3,304	74.1
Easy	338	8.1	639	12.4	244	4.1	639	12.4
Somewhat Difficult	413	8.5	416	8.7	173	3.5	416	8.7
Very Difficult	275	5.6	211	4.4	134	2.9	211	4.4
Could Not Fill Vacancy	40	0.9	17	0.4	21	0.5	17	0.4
n	4,010		4,587		4,526		4,587	

Source: Schools and Staffing Survey, various years. Public School Surveys.

*Weighted percents

School Staffing Difficulties and District Fiscal Recruitment Incentives
for Hard-to-Staff Subjects and Locations

Schools' staffing difficulties are examined in conjunction with their locations to identify in which location categories there were consistencies between school staffing challenges and district use of economic recruitment incentives. Table 8 shows data for districts' use of fiscal incentives according to a district location variable of urban, suburban, or rural. Table 12 displays data for schools' staffing difficulties for subject shortage areas by the schools' locations.

Similarities were evident between schools and districts for the hard-to-staff subjects of special education and math in all locations. Schools in urban, suburban, and rural districts reported special education as the first or second most challenging subject shortage area to staff over all four SASS cycles. It was also the hard-to-staff subject most often targeted with fiscal recruitment incentives by districts in all locations from 1990-1991 to 2003-2004. During the same time period, proportions of schools in all three location categories reporting staffing math positions as "very difficult" or "could not fill vacancy" increased two to threefold, with schools in urban districts surveying the largest increases. Comparable longitudinal findings were evident for districts' use of fiscal recruitment incentives aimed at math teachers in each location category.

Discrepant patterns were found between schools' staffing challenges and districts' economic incentives for ESL/bilingual education and foreign language. Suburban and rural schools ranked foreign language as one of the top three most difficult to staff subjects for each SASS cycle. In comparison, districts in suburban and rural locations offered their lowest percentages of fiscal recruitment incentives for foreign language, as did urban districts.

ESL/bilingual education was reported by schools in all location categories as one of the least difficult to staff subject shortage areas. Similarly, rural districts surveyed offering their smallest share of economic incentives to recruit ESL/bilingual education teachers. However, urban and suburban districts dedicated their second or third largest share of recruitment incentives to attract teachers of this hard-to-staff subject.

Table 12

Incidence of School Difficulty Filling Staffing Vacancies in Subject Shortage Areas by District Locations

Difficulty Filling Staffing Vacancy In Subject Shortage Areas	2003-2004			1999-2000			1993-1994			1990-1991		
	Location			Location			Location			Location		
	Percent*			Percent*			Percent*			Percent*		
Math	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Not Applicable	44.8	52.4	68.7	44.3	41.5	57.9	57.4	57.0	68.3	57.0	58.3	65.8
Easy	15.4	15.5	7.9	14.2	12.8	10.4	19.4	25.6	17.1	24.7	24.1	18.4
Somewhat Difficult	19.8	18.8	12.6	16.6	22.0	13.9	13.8	13.1	10.9	10.5	13.9	11.0
Very Difficult	16.5	11.8	10.3	22.1	22.2	16.9	9.1	4.2	3.6	6.7	3.7	4.6
Could Not Fill Vacancy	3.5	1.5	0.5	2.7	1.5	1.2	0.3	0.2	0.1	1.1	0.0	0.2
Science												
Not Applicable	63.6	64.7	76.7	56.3	57.0	70.3	68.0	69.7	78.5	70.0	72.7	79.3
Easy	11.3	11.4	6.3	14.7	11.7	8.0	15.9	14.0	9.7	15.7	13.9	10.0
Somewhat Difficult	15.3	14.1	9.9	14.9	18.1	10.7	9.6	11.5	8.6	9.5	8.5	7.5
Very Difficult	12.0	9.7	6.1	13.0	12.6	10.3	5.6	4.7	3.2	4.2	4.2	3.0
Could Not Fill Vacancy	2.4	0.7	1.2	1.2	0.8	0.8	1.0	0.2	0.2	0.6	0.9	0.2
n	636	1,373	1,391	809	1,366	1,643	691	1,564	1,912	724	1,515	2,050

Source: Schools and Staffing Survey, various years. Public School Surveys.

* Weighted percents

Table 12 (continued)

Incidence of School Difficulty Filling Staffing Vacancies in Subject Shortage Areas By District Locations

	2003-2004			1999-2000			1993-1994			1990-1991		
	Location			Location			Location			Location		
Difficulty Filling Staffing Vacancy In Subject Shortage Areas	Percent*			Percent*			Percent*			Percent*		
Special Education	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Not Applicable	45.6	56.8	71.8	44.7	46.7	59.9	53.0	63.2	68.4	52.5	60.9	67.7
Easy	13.0	13.9	7.6	13.2	14.7	8.7	18.9	16.4	13.5	18.7	17.6	10.9
Somewhat Difficult	23.7	16.9	11.9	18.9	19.4	13.5	15.1	14.3	12.4	14.3	12.0	11.1
Very Difficult	14.8	11.2	7.0	17.9	16.8	15.1	10.8	5.9	5.3	11.1	8.5	8.6
Could Not Fill Vacancy	2.9	1.3	1.8	5.3	2.5	2.7	2.3	0.2	0.5	3.5	1.1	1.7
ESL/Bilingual Education												
Not Applicable	81.3	86.4	93.5	79.6	83.2	90.1	84.7	88.5	92.5	83.2	89.6	95.4
Easy	4.8	5.0	1.5	4.9	4.7	2.3	6.0	4.8	1.9	6.6	3.5	2.0
Somewhat Difficult	7.2	4.5	2.1	8.5	5.1	2.6	4.5	3.8	2.9	4.6	3.1	1.2
Very Difficult	6.5	3.9	2.8	6.3	5.5	4.5	3.9	2.5	2.6	4.9	3.3	1.3
Could Not Fill Vacancy	0.3	0.3	0.2	0.7	1.4	0.5	0.8	0.3	0.1	0.8	0.6	0.1
n	636	1,373	1,391	809	1,366	1,643	691	1,564	1,912	724	1,515	2,050

Source: Schools and Staffing Survey, various years. Public School Surveys.

* Weighted percents

Table 12 (continued)

Incidence of School Difficulty Filling Staffing Vacancies in Subject Shortage Areas By District Locations

	2003-2004			1999-2000			1993-1994			1990-1991		
	Location			Location			Location			Location		
Difficulty Filling Staffing Vacancy In Subject Shortage Areas	Percent*			Percent*			Percent*			Percent*		
Foreign Language	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
Not Applicable	64.9	70.1	83.7	63.8	63.0	72.3	72.8	71.6	79.9	73.6	72.8	79.2
Easy	11.5	8.4	3.3	8.6	8.8	3.8	11.5	12.3	5.4	13.8	13.1	6.3
Somewhat Difficult	14.8	11.7	5.2	15.4	13.8	8.3	8.7	10.3	7.5	5.4	8.0	6.9
Very Difficult	8.5	8.4	6.4	10.8	13.3	13.7	5.6	5.2	6.9	6.2	5.9	6.7
Could Not Fill Vacancy	0.3	0.8	1.4	1.4	1.2	1.9	1.5	0.5	0.4	1.0	0.3	0.8
Vocational Technology												
Not Applicable	74.1	75.2	82.2	72.5	71.2	74.4	88.3	87.5	90.3	76.7	73.4	74.2
Easy	9.1	9.2	6.2	6.2	6.9	7.1	4.6	4.1	4.5	11.2	12.3	12.9
Somewhat Difficult	9.4	9.2	5.7	11.1	9.8	7.4	2.9	4.5	2.9	8.5	9.6	8.2
Very Difficult	5.9	5.8	5.0	8.1	10.7	9.3	4.0	3.2	1.9	3.4	4.5	4.2
Could Not Fill Vacancy	1.5	0.7	0.9	2.1	1.4	1.8	0.2	0.8	0.5	0.2	0.2	0.6
n	636	1,373	1,391	809	1,366	1,643	691	1,564	1,912	724	1,515	2,050

Source: Schools and Staffing Survey, various years. Public School Surveys.

* Weighted percents

Summary

Increasing numbers of public school districts are implementing fiscal recruitment policies to attract teachers with in-demand skills to hard-to-staff subjects and locations. Yet, policymakers at all levels lack sufficient data for evaluating the effectiveness of such policies. Little empirical research has quantitatively explored foundational questions associated with district economic recruitment incentives, such as how many or what types of districts offer these incentives.

For this research, descriptive analysis of the School and Staffing Surveys 1990 through 2004 profiled characteristics and usage patterns of districts recruiting teachers with fiscal incentives for hard-to-staff subjects and locations. Findings for these two types of incentives are summarized below.

Subject shortage areas:

- Districts offered a larger proportion of fiscal recruitment incentives for subject shortage areas than for hard-to-staff locations for four SASS cycles; by 2003-2004, the ratio was 3 to 1.
- The number of districts providing economic recruitment incentives increased with each sequential SASS cycle for all subject shortage areas apart from vocational technology; math and ESL/bilingual education had the largest gains in frequency.
- Special education garnered the largest proportions of district fiscal recruitment incentives over the fourteen-year period.
- Math experienced the largest growth rate for district economic recruitment incentives for hard-to-staff subjects; the growth rate for this incentive tripled from 1990-1991 to 2003-2004.
- Districts dedicated their smallest proportions of economic recruitment incentives to foreign language or vocational technology for all SASS cycles.

Hard-to-staff locations:

- Urban and rural districts offered larger proportions of economic incentives to recruit teachers for all four SASS cycles.
- Percentages of districts recruiting with economic incentives increased as the district's level of minority students increased. Similar patterns were identified for districts with varying percentages of students in poverty.

Subject shortage areas in hard-to-staff locations:

- For all SASS survey years, urban districts offered teachers of subject shortage areas a larger share of economic recruitment incentives than suburban or rural districts by a ratio of nearly four to one for suburban districts and eleven to one for rural districts.
- Districts in all three locations targeted their largest proportions of fiscal recruitment incentives to special education. Urban districts were two to three times more likely than suburban or rural districts to offer these incentives between 1993 and 2004.
- Percentages of districts in all location categories offering economic recruitment incentives for math increased two- to three-fold from 1990 to 2004, representing the largest growth rate for fiscal incentives targeting hard-to-staff subjects in urban, suburban, or rural districts.
- High minority and high poverty districts offered their largest proportions of fiscal incentives to recruit special education and math teachers.

The SASS surveyed public schools to identify which subject shortage areas posed the greatest staffing challenges. School responses were compared to SASS district survey results to identify similarities between subject shortage areas schools reported as very difficult to staff or could not be staffed and those targeted by districts with fiscal recruitment incentives. The following key comparisons were identified:

- For survey years 1990 through 2004, schools reported special education and math as two of the most difficult subject shortage areas to staff. Similarly, these subject shortage areas received the largest proportions of district fiscal incentives during the same survey years regardless of the districts' location.
- Inconsistent patterns were evident between schools' staffing challenges and districts' fiscal recruitment incentives for the hard-to-staff subjects of ESL/bilingual education and foreign language.

While this longitudinal profile quantifies patterns and trends in districts' use of fiscal recruitment incentives, it leaves many questions yet to be answered regarding the effectiveness of such policies. Additional analysis of SASS data is needed to gain a better understanding of the relationship between district fiscal recruitment policies and their influence on attracting nontraditional teachers and high quality teachers to hard-to-staff subjects and locations. The next

phase of this research, regression analysis investigates which types of teachers are recruited to districts offering fiscal recruitment incentives. Additionally, estimated teachers' salary equations identify how much more teachers receiving a district financial incentive are paid.

CHAPTER IV

Effect of Incentives on Recruitment

Introduction

This chapter describes the regression analysis investigating what types of teachers districts recruit with fiscal incentive policies for subject shortage areas. To begin, the data and sample from the Schools and Staffing Surveys (SASS) are detailed, followed by an explanation of how variables for exploring these research questions are measured. Next, the methodology conducted with multivariate regression is described. Finally, analysis findings are presented.

Overview of Regression Analysis

Two regression models examine whether districts using economic recruitment incentives are likely to attract more teachers to instruct curricular areas that districts and their schools report as chronically hard to staff. Two subgroups of full time teachers are incorporated into the regression models: nontraditional teachers that are new entrants to the teacher labor market, and teachers with a college major in the shortage field they instruct.

The first regression is the nontraditional teacher model, which examines whether districts using fiscal incentives for hard-to-staff subjects recruit more nontraditional teachers. The dependent variable, nontraditional teachers, is limited to first year, full time nontraditional teachers as constraints in SASS survey questions prohibit the identification of veteran, nontraditional teachers. The independent variable of primary interest is districts offering economic rewards to recruit teachers to hard-to-staff fields.

The second regression is the subject area major model. This model employs fixed effects to predict whether a district using fiscal recruitment incentives for shortage fields attracts more teachers with a college major in the shortage field they instruct than when the same district does not use such incentives. These questions are answered by regressing teachers with a college major in the subject shortage area they instruct on first year teachers and veteran teachers of subject shortage areas. The districts in which all of these teachers work offer have offered fiscal recruitment incentives for subject shortage areas during at least one SASS cycle.

A fixed effects regression methodology was used for this research question to account for unobservable differences between districts, differences that may be related to other district policies that impact the recruitment of high quality teachers and cannot be accounted for with control variables. For instance, some districts with fiscal recruitment policies may have other policies that attract high quality teachers, such as innovative programs. In this example, it may be the districts' innovative programs that are impacting the recruitment of teachers with a major in their field of instruction, and not the districts' fiscal recruitment incentives. By using fixed effects, the estimates on the independent variables (first year teachers and veteran teachers of subject shortage areas) attribute to the dependent variable (teachers with a college major in the shortage field) only the effects of fiscal recruitment incentive policies and not the effects of other districts' policies or characteristics.

When considering the rationale for using fixed effects in the subject area major regression model, one might wonder why fixed effects were not used in the nontraditional regression model rather than OLS regression. The rationale for not using fixed effects in the nontraditional model is the sample size. The fixed effects subject area major regression model requires districts to be matched with their teachers of subject shortage areas. Because there are a fair number of subject shortage area teachers in SASS, the sample size for analysis is adequate. If fixed effects were used for the nontraditional model, districts would be matched with their first year, nontraditional teachers, of which there are relatively few represented in the SASS survey. The result would be a very small sample size that produces large standard errors for the nontraditional model.

Data and Sample

Data for this research are taken from the Schools and Staffing Surveys (SASS), a national survey administered at four year intervals by the National Center for Education Statistics (NCES) to both private and public school districts, schools, administrators and teachers. SASS survey respondents are randomly selected from schools from across the country in various geographical areas. Districts and administrators associated with these schools are surveyed, along with a random sample of teachers from each school.

The data source for this study includes district and teacher responses to four cycles of SASS conducted in 1990 through 2004, with each cycle surveying a nationally representative sample of approximately 4,800 to 5,500 public school districts, and 46,000 to 56,000 public school teachers. SASS uses sampling weights to account for disproportionate representation of respondents due to over sampling of large districts or under sampling of small districts. All district and teacher respondents included in this analysis are from the public sector.

Analysis Sample for Regression Models

A key feature impacting the output of the two regression models is the analysis sample that differs for each model. The nontraditional model's analysis sample includes all of the SASS district respondents (n=18,988) and their respective first year, full-time teacher respondents (n=6,398). The large analysis sample offers a broad view for conducting cross-sectional analysis to identify what types of teachers districts attract when using fiscal recruitment incentives for shortage fields.

The components of the analysis sample for the subject area major model provide a narrower focus for the fixed effects analysis. This analysis sample is comprised of 319 districts and their corresponding 4725 full time teachers of subject shortage areas working in districts offering incentives to this type of teacher during at least one SASS cycle. The multiple considerations constraining which districts and teachers are included in this regression model's analysis sample are explained below and summarized in Table 13.

First, districts that did not offer fiscal recruitment incentives for subject shortage areas for at least one SASS cycle are dropped. As noted in previous chapters of this research, the following subject shortage areas are identified in related literature as curricular areas districts and schools report as chronically difficult to staff: Mathematics, Science, Special Education, ESL/Bilingual Education, Vocational Education, and Foreign Language. Also excluded are teachers matched with these districts.

Second, districts reporting continuous use of a fiscal incentive policy for all four SASS cycles are excluded from the analysis sample. The fundamental intent of this regression model is to explore the types of teachers a district attracts when adopting and abandoning a fiscal

recruitment policy. Therefore, only districts reporting a switch in their use of an economic recruitment incentive policy can be considered for inclusion in the analysis sample.

Third, also omitted from the analysis sample are districts without responses for all four SASS cycles. Simply stated, district responses cannot be analyzed for changes in their economic recruitment policies if no responses exist. Because districts are randomly selected to complete the SASS for each new survey cycle, districts lacking responses were most likely not chosen to participate during a particular SASS cycle.

Finally, the most restrictive limitation on the analysis sample for the subject area major regression model pertains to districts' response patterns to SASS questions regarding their use of fiscal recruitment incentives for shortage fields. SASS systematically asks districts about their use of fiscal recruitment incentives in each of the four cycles, thus providing data for analyzing how such incentives affect the composition of the teacher workforce over time.

In each survey cycle, SASS asks districts if they use fiscal incentives to attract teachers to subject shortage areas.²⁰ The accuracy of districts' responses to this question is particularly important for fixed effects regression analysis. This type of regression analysis permits investigation of changes to the teacher workforce within a district when the district adopts a fiscal recruitment policy for subject shortage areas and then discontinues the policy, or vice versa, during the four SASS cycles. If districts' responses are erroneous, thereby producing longitudinal patterns of district responses that are suspect, the conditions for using a valid fixed effects regression model are jeopardized.

Unfortunately, a lack of information regarding the rate of district response variance raises concerns for fixed effects regression analysis. A random subsample of respondents to the school, administrator, and teacher SASS surveys were re-interviewed by NCES to measure how consistently they answered selected survey questions. The re-interviewed respondents produced moderate to fairly high response variance (Ennis and Miller, 2004; Royce, 1994). District respondents were not re-interviewed. Despite the increased likelihood of recall error and

²⁰ The district survey questions regarding recruitment incentives for each of the four SASS cycles read: 1990-91 and 1993-94 "Does this school district currently use any of the pay incentives listed above (cash bonus, different step on the salary schedule, or other salary increase) to recruit or retain teachers to teach in less desirable locations?" "Does this school district currently use any of the pay incentives listed above (cash bonus, different step on the salary schedule, or other salary increase) to recruit or retain teachers to teach in fields of shortage?" 1999-00 and 2003-04 "Does this district currently use any pay incentives such as cash bonuses, salary increases, or different steps on the salary schedule to recruit or retain teachers to teach in less desirable locations?" "Does this district currently use any pay incentives to recruit or retain teachers to teach in fields of shortage?"

response error inherent to the self-reporting nature of SASS, SASS is widely recognized as a reliable, nationally representative data source (McLesky, Tyler, and Saunders Flippin, 2004). Nonetheless, because the validity of findings from this fixed effects analysis is dependent upon the accuracy of districts' responses, this study evaluates the plausibility of each district's longitudinal response patterns concerning its use of fiscal recruitment incentives.

The rationale for examining each district's longitudinal response pattern is to identify districts with response patterns that are plausible or implausible from a policy perspective, and retain in the analysis sample only those districts with plausible response patterns. Inclusion of districts with implausible response patterns would contribute to unreliable statistical results, such as misestimating independent variable coefficients. The discussion that follows describes in detail how districts' response patterns regarding their use of fiscal recruitment incentives are classified as plausible or implausible from a policy implementation perspective

Identifying Districts with Plausible and Implausible Response Patterns

A merging of districts from all four SASS cycles into one dataset permitted the plausibility of each district's response pattern to be examined over time. This research defines a plausible district response pattern as either of the following scenarios: 1) a district reports switching from using fiscal incentives as a recruitment policy to not using such a policy only once over the four SASS cycles. For example, a district reports having the policy in 2003-2004, and then reports not having such a policy in survey years 1999-2000, 1993-1994, and 1990-1991 (yes-no-no-no); or 2) a district reports not using a fiscal recruitment incentive policy, and sometime over the four SASS cycles, switches to having this policy. For instance, a district reports not having a policy in survey years 2003-2004 and 1999-2000, but then reports having a policy in 1993-1994 and 1990-1991 (no-no-yes-yes). In both scenarios, the district's responses are feasible from a policy perspective as there is no reoccurring back and forth between adopting and terminating a fiscal recruitment incentive policy.

An implausible district response pattern is characterized as erratic between SASS cycles, alternating between having and not having a fiscal recruitment policy more than once between 1990 and 2004. For example, a district that responded "yes" to using fiscal recruitment incentives during SASS survey years 2003-2004, and "no" in 1999-2000, "yes" again in 1993-

1994, but “no” in 1990-1991 (yes-no-yes-no) would be an unrealistic or implausible response pattern scenario. Other examples of implausible response patterns are: yes-yes-no-yes; no-yes-yes-no; or no-yes-no-yes.

From a policy implementation perspective, district response patterns indicating an erratic adoption or termination of a policy are unlikely. While adopting and terminating policies is standard practice for districts, from a policy perspective, it would be unusual for a district to adopt a policy, terminate the policy, and then re-adopt the same or similar policy. An erratic district response pattern to SASS questions about districts’ fiscal recruitment incentive usage is more likely a result of survey response error than an accurate reflection of district policy implementation. Ballou (2001) points out the high rate of response error associated with SASS questions containing words or terms that can be misconstrued. For example, district respondents, when asked if any of the listed pay incentives were used to recruit teachers to hard-to-staff subjects, may not have been certain what was intended by the listed choice of “other salary increase.”

The elimination of districts with implausible response patterns reduces the possibility of response error, thereby contributing to a more conservative analysis sample of 319 districts with plausible response patterns. If districts with implausible response patterns were retained in the sample, the independent variables’ coefficients would be underestimated and bias towards zero.

Table 13
Incidence of District Response Patterns Regarding Their Fiscal Recruitment
Incentive Policies for Subject Shortage Areas
SASS Years 1990-2004

District Response Pattern	Frequency	Percent
Districts indicating they used incentives in a plausible pattern	319	3.3
Districts indicating they used incentives in an implausible pattern	139	1.4
Districts indicating they never used incentives	740	7.6
Districts indicating they always used incentives	22	0.2
Districts did not participate in all four SASS cycles	8,528	87.5
n	9,748	100

Source: Schools and Staffing Survey, various years. Public School District Survey.

Methodology

Analysis for this research is conducted using multivariate regression to investigate the relationship between different types of teachers and districts' fiscal recruitment incentives. Details of the two regression models' specifications and their analytical methodology are described below.

Methodology for Nontraditional Model

The first regression, the nontraditional model, examines whether districts using fiscal incentives to recruit teachers of subject shortage areas attract more nontraditional teachers. The dependent variable is a binary variable coded 1 for first year, full time teachers classified in this research as nontraditional and 0 for all other first year, full time teachers. For this study, nontraditional teachers include mid-career professionals, prior military personnel, and retirees.

What characterizes these teachers as nontraditional is their work experience outside of education before entering the teacher workforce. Part-time and veteran nontraditional teachers are excluded, leaving 582 first year, full-time nontraditional teachers satisfying the criteria for the dependent variable. In this study, the screen for what classifies a teachers as nontraditional is stringent. If a broader definition of nontraditional teachers had been used, the number of teachers

meeting the conditions for inclusion in the dependent variable most certainly would have increased. Nonetheless, the criteria used to categorize teachers as nontraditional is rooted in contemporary educational literature and research, and expanding the definition of a nontraditional teacher was not a consideration.

Preferably, the SASS data would permit analysis of all nontraditional teachers categorized by various years of teaching experience for all four cycles of SASS. However, limitations imposed by inconsistencies in SASS questionnaires only permit the identification of first-year nontraditional teachers. Foundational to categorizing teachers as nontraditional is knowing the teachers' activity or employment prior to entering the teaching profession. The SASS datasets for the 2003-04 and 1999-00 surveys only contain information about the prior activity or employment for participants who are new teachers for years 2003-04 and 1999-00. In contrast, the 1993-94 and 1990-91 surveys are not limited in this way, and data regarding the prior activity or employment of nontraditional teachers is available for new and veteran nontraditional teachers.

Due to the limitations of the 2003-04 and 1999-00 surveys, analysis of prior employment of nontraditional teachers who are not first year teachers is prevented. As such, for this study, nontraditional teachers are limited to those who are new entrants to the teaching profession, and veteran, nontraditional teachers are excluded.

An option for this study was to explore the effects of district fiscal incentives on new and veteran teachers by limiting analysis to the SASS survey cycles 1990-1994 as these cycles contain the requisite questions for identifying veteran nontraditional teachers. However, many of the federal and state initiatives funding teacher recruitment were only beginning to emerge during that time period. It was not until the latter years of the SASS cycles that federally and state sponsored teacher recruitment policies were more prevalent. To better understand the impact teacher recruitment is having on the teacher labor market, this study examines a longer time period of SASS when there are greater numbers of teacher recruitment policies initiatives rather than a shorter time period of SASS when these policies were fewer in numbers. The trade-off is the dependent variable is limited to only first year, nontraditional teacher rather than all nontraditional teachers.

The primary independent variable of interest for the nontraditional model is districts offering fiscal recruitment incentives for subject shortage areas (District Shortage Incentive; n=2286).

Multiple control variables account for unobservable variations across districts that may contribute to omitted variable bias or selection bias. Examples of bias result from correlations between district fiscal recruitment incentives and district characteristics which may influence the likelihood a nontraditional teacher is recruited to a particular district. For instance, related research shows districts with high percentages of minority students have greater difficulties attracting teachers to staffing vacancies than districts with low percentages of minority students. Thus, high poverty districts may be more inclined to offer fiscal incentives to recruit teachers for staffing vacancies.

To address the potential confounding effects of districts' characteristics, the specifications for this first regression model incorporate variables controlling for district percentages of minority students and economically disadvantaged students, districts' pay for teachers with a Bachelor's degree and no experience, and binary coded variables for districts' locations and districts with teachers' unions. Teacher labor market studies suggest controlling for the district characteristics measured by these variables will produce a cleaner estimate of the effect of district incentive policies aimed at shortage fields on the recruitment of nontraditional teachers.

An alternative specification for the nontraditional regression model is estimated to include interaction terms. To capture the combined effects of districts with economic recruitment rewards and districts' levels of minority and economically disadvantaged students on the recruitment of nontraditional teachers, four interaction terms are also specified as independent variables: District Shortage Incentive by High Minority, District Shortage Incentive by Low Minority, District Shortage Incentive by High Poverty, and District Shortage Incentive by Low Poverty. Estimates for the interaction terms will provide more detailed predictions of which types of districts will have a greater impact on the recruitment of nontraditional teachers.

Useful for gaining perspective on the output for the first regression model is a description of what types of districts have attracted first year, full time teachers as compared to first year, full time nontraditional teachers (Table 14). Only districts with select characteristics that are most relevant to the regression models are included in this comparison.

During the fourteen-year period of SASS cycles 1990-2004, 28.3% of first year, full time teachers worked in districts with economic recruitment rewards. In comparison, slightly more than one-third of first year, full time nontraditional teachers worked in districts using such

incentives (37.5%). Some 9.7% of first year, full time teachers were recruited to high minority districts that offered economic recruitment incentives while nearly 17.9% of first year, full time nontraditional teachers worked in these districts. High poverty districts with fiscal recruitment incentive policies also attracted greater proportions of first year, full time nontraditional teachers (12.5%) than first year, full time teachers (7.9%).

There are several factors that may have contributed to the findings from this comparison. One possibility is that districts without a fiscal recruitment incentive policy for subject shortage areas prefer teachers that are traditionally prepared and hire fewer nontraditional teachers. Or, federal or state initiatives funding the recruitment of nontraditional teachers may require them to work in hard-to-staff districts, districts which SASS descriptive data identify as offering the largest proportions of fiscal recruitment incentives for subject shortage areas. For example, a contingency of participating in Teach For America is teacher candidates agree to work in high needs schools.

Table 14
Incidence of First Year, Full Time Nontraditional Teachers and
First Year, Full Time Teachers Relative to District Characteristics
SASS Years 1990-2004

Independent Variables	First year, Full time Nontraditional Teachers n= 582		First year, Full time Teachers n= 6398	
	Frequency	Percent	Frequency	Percent
District Shortage Incentive	218	37.5	1810	28.3
District Shortage Incentive by High Minority	104	17.9	622	9.7
District Shortage Incentive by Low Minority	40	6.9	548	8.6
District Shortage Incentive by High Poverty	73	12.5	504	7.9
District Shortage Incentive by Low Poverty	19	3.3	257	4.0

Source: Schools and Staffing Survey, various years. Public School District and Teacher Surveys.

Methodology for Subject Area Major Model

The second regression, the subject area major model, employs fixed effects to predict whether a district using fiscal incentives for subject shortage areas during at least one SASS cycle attracts more teachers who have a major in the shortage field they instruct than when the same district does not use such incentives. A binary coded dependent variable represents teachers instructing a subject shortage area for which they have a college major (MajorAssign ShortArea). Additionally, teachers are only included in the dependent variable if their districts have plausible response patterns to questions concerning their use of fiscal recruitment incentives. A total of 2,778 teachers fulfill the conditions for inclusion in the dependent variable.

Key independent variables of interest for the subject area major model are two interaction terms. These are first year or veteran teachers interacted with teachers of subject shortage areas working in districts that not only used fiscal recruitment for shortage fields sometime during the four SASS cycles, but also offered such incentives when the first year and veteran teachers were working in these districts. The first interaction term captures the effect of first year teachers by teachers of subject shortage areas working in districts offering fiscal rewards to recruit them (Y1Teach by Assign ShortArea Incentivized, n=101) on teachers with a major in the shortage field they instruct (MajorAssign ShortArea). Estimates from regressing MajorAssign ShortArea on Y1Teach by Assign ShortArea Incentivized will show when a district offers shortage field incentives to recruit first year teachers of shortage fields, how many more of these first year teachers are predicted to have a major in the shortage field they instruct, in other words be teachers of high quality.

The second interaction term measures the effect of veteran teachers by teachers of subject shortage areas working in districts offering fiscal rewards to recruit them (VetTeach by Assign ShortArea Incentivized, n=1,734) on teachers with a major in the shortage field they instruct (MajorAssign ShortArea). Regressing MajorAssign ShortArea on VetTeach by Assign ShortArea Incentivized will reveal how many more veteran teachers are predicted to have a major in the shortage field they instruct when the veteran teachers work in a district offering fiscal rewards to recruit veteran teachers of shortage fields.

As indicated in Table 15, of the 229 first year teachers included in the analysis, less than half are first year teachers of shortage fields working in districts offering these teachers shortage

field recruitment incentives. With only 101 observations, it is expected that the estimate for Y1Teach by Assign ShortArea Incentivized will be imprecise.

Table 15
Incidence of Select Independent Variables Included in the
Subject Area Major Model with Fixed Effects
SASS Cycles 1990-2004

(Dependent Variable: 1 = Teachers with Major in Subject Shortage Area They
Instruct (MajorAssign ShortArea))

Select Independent Variables *	Frequency	Percent
Y1Teach	229	4.9
Y1Teach by Assign ShortArea Incentivized	101	2.14
VetTeach by Assign ShortArea Incentivized	1734	36.7
n= 4725 Full Time Teachers of Subject Shortage Areas Working in Districts Offering Incentives for Subject Shortage Areas Sometime During SASS Cycles		

Source: Schools and Staffing Survey, various years. Public School District and Teacher Surveys.

* All Teachers Work in Districts with Plausible Patterns for Fiscal Recruitment Incentive Policies for Subject Shortage Areas

Control variables are specified in the subject area major regression model to account for a district's unobservable characteristics that may bias whether teachers with a major in the shortage field they instruct choose to work in the district. These control variables are district bachelor pay for teachers with no experience, district percentages of minority students and economically disadvantaged students, and a dummy variable for a district with a teachers' union.

Findings

What types of teachers are more likely to be recruited to districts with fiscal incentive policies for shortage fields? Regression analysis suggest districts' fiscal recruitment incentive policies for subject shortage areas are predicated to have a notable impact on broadening the pool of qualified teacher candidates and increasing the proportions of high quality teachers. Findings from the nontraditional model indicate districts with fiscal recruitment incentive policies for shortage fields are likely to recruit more nontraditional teachers. Estimates from the subject area major model suggest districts adopting fiscal policies to recruit more high quality teachers of

shortage fields, defined as teachers with a major in their field of instruction, will attract more high quality, veteran teachers of subject shortage areas than when the districts do not offer these policies. A detailed description of the regression analysis findings is presented in the sections that follow.

Findings for Nontraditional Model

When districts offer fiscal incentives to recruit teachers of subject shortage areas, do they attract more nontraditional teachers?

The first analysis model regresses first-year, full time nontraditional teachers on a dummy variable for districts offering fiscal incentives to recruit teachers of subject shortage areas (District Offers Shortage Incentive). The model is re-estimated with interaction terms for District Offers Shortage Incentive by districts' percentages of minority and economically disadvantaged students to capture the combined effects of district fiscal recruitment incentive policies and district characteristics on the recruitment of nontraditional teachers. In the sections that follow, findings for the base model specified without interaction terms are discussed, then results for the alternative model, which introduces interaction terms among the regressors, are presented. Select findings are displayed in Table 16.

For the base model, the 0.02 estimate on District Offers Shortage Incentive is statistically significant and offers insight into the relationship between district fiscal recruitment incentives and nontraditional teachers. If the merit of district fiscal recruitment policies were measured by a predicted 2% increase in the recruitment of nontraditional teachers who are entering the teacher workforce, these policies would likely be judged as moderately effective. This finding offers policymakers promising evidence that district fiscal incentive policies are an effective recruitment strategy for attracting nontraditional teachers, thereby increasing the pool of qualified candidates to the teaching profession. Yet, caution is warranted when using the predicted estimate of 0.02 as a measurement of policy effectiveness as it is only twice as large as the 0.01 standard error, and therefore imprecise.

Table 16
Findings for Nontraditional Model

(Dependent Variable: 1=First Year, Full Time Nontraditional Teachers)

Independent Variables	Coefficient (SE)	Coefficient (SE)
	Without Interaction Terms	With Interaction Terms
District Offers Shortage Incentive	0.02* (0.01)	0.02 (0.03)
District Offers Location Incentive	0.02 (0.01)	0.03 (0.03)
District Location Urban	0.04* (0.02)	0.05* (0.02)
District Location Suburban	0.03 (0.02)	0.04 (0.02)
District Location Rural	0.004 (0.02)	0.01 (0.02)
District Poverty Level High	-0.01 (0.01)	-0.008 (0.01)
District Poverty Level Low	-0.02 (0.01)	-0.006 (0.01)
District Minority Level High	0.03** (0.01)	0.02 (0.01)
District Minority Level Low	-0.03** (0.01)	-0.02* (0.01)
District Offers Location Incentive By High Poverty		0.01 (0.03)
District Offers Location Incentive By Low Poverty		-0.04 (0.03)
District Offers Location Incentive By High Minority		-0.03 (0.03)
District Offers Location Incentive By Low Minority		0.0007 (0.03)
District Offers Shortage Incentive By High Poverty		-0.01 (0.03)
District Offers Shortage Incentive By Low Poverty		-0.02 (0.03)
District Offers Shortage Incentive By High Minority		0.03 (0.03)
District Offers Shortage Incentive By Low Minority		-0.01 (0.03)

Source: Schools and Staffing Survey, various years. Public School District and Teacher Surveys.

* significant at .05

** significant at .01

Another independent variable has a statistically significant coefficient- urban districts (District Location Urban). Urban districts are predicted to recruit 4% more nontraditional teachers than districts in other locations. This result supports descriptive SASS data identifying urban districts as offering subject shortage area incentives in greater incidences than suburban or rural district by a ratio of nearly four to one for suburban districts and eleven to one for rural districts. Note, however, that the standard error is large at 0.02.

The coefficient for districts with high percentages of minority students (75% or greater) is also positive at 3% and statistically significant. Such a finding is expected given the positive and statistically significant coefficient for District Location Urban as urban districts are generally characterized as having high percentages of minority students. What is surprising is District Poverty Level High has no significant effect on nontraditional teachers. The expectations was the coefficient for District Poverty Level High would be similar to the coefficients for District Location Urban and District Minority Level High as education research has historically documented high levels of students in poverty and minority students in urban districts.

Estimates from the alternatively specified model with the interaction terms yield a statistically insignificant coefficient on District Offers Shortage Incentive and a standard error of 0.03 which is larger than the standard error for the base model. Findings from this model give no indication of which types of districts are having an impact on the recruitment of nontraditional teachers other than districts located in urban settings and districts with low levels of minority students. The coefficient District Location Urban is a statistically significant 0.05, and for District Minority Level Low, the coefficient is significant and negative (-0.03), with 0.01 standard errors for both estimates.

Findings for Subject Area Major Model

When a district switches from offering to not offering fiscal recruitment incentives for shortage fields, or vice versa, are they more likely to recruit high quality teachers as indicated by having a college major in the shortage field they instruct? If so, are these high quality teachers new to the teacher labor market or veteran teachers?

Reviewed in this section are the results for the subject area major model using fixed effects, with select findings displayed in Table 17. This model regresses teachers with a college major in the subject shortage area they instruct (MajorAssign ShortArea) on two key independent variables. These are: first year teachers or veteran teachers interacted with teachers of subject shortage areas working in districts incentivizing recruitment to subject shortage areas (Y1Teach by Assign ShortArea Incentivized and VetTeach by Assign ShortArea Incentivized).

Table 17
Findings for Subject Area Major Model

(Dependent Variable: 1= Full Time Teachers with Major and Assignment
in Subject Shortage Area (MajorAssign ShortArea))
-All Teacher Work in Districts with Plausible Patterns for Fiscal Recruitment
Incentive Policies for Subject Shortage Areas

Independent Variables	Coefficient (SE)
Y1Teach by Assign ShortArea Incentivized	0.11 (0.07)
VetTeach by Assign ShortArea Incentivized	0.05** (0.02)
Y1Teach	-0.15** (0.04)
Bachelor pay no experience	0.000001 (0.000004)
District percent poverty	-0.001** (0.0005)
District percent minority	0.0003 (0.0006)
District has teachers' union	0.06 (0.16)

Source: Schools and Staffing Survey, various years. Public School District and Teacher Surveys.
** significant at .01

Before proceeding, a few clarifying points are needed. The districts included in the analysis sample have plausible response patterns regarding their use of fiscal recruitment incentive policies. A district with a plausible response pattern means the district switched from having to not having such a policy, or not having to having a policy, only once during the four SASS cycles. Capturing the change in a district's policy is elemental for investigating whether a district attracts more teachers with a college major in the shortage field they instruct when a district switches from offering to not offering fiscal recruitment incentives for shortage fields, or vice versa. Therefore, teachers with a major and assignment in a shortage area (MajorAssign ShortArea), the dependent variable, worked in a district that either offered or did not offer fiscal recruitment incentives during the time the teachers were employed by the district.

A differentiating factor for the teachers included in the interaction term, Y1Teach by Assign ShortArea Incentivized and VetTeach by Assign ShortArea Incentivized, is these teachers instructed shortage fields during the SASS cycles when their districts were offering economic incentives to recruit these teaches. The distinction between first year teachers and veteran teachers is made to account

for anticipated differences in coefficients for these independent variables. Veteran teachers are expected to be less responsive to fiscal recruitment incentives due to lack of motivation to change districts. Large proportions of veteran teachers may have been in the teacher labor market before fiscal recruitment policies emerged and may not be motivated to move from their current district to a new district in order to receive a financial recruitment reward. Also, many veteran teachers are reluctant to change districts due to tenure rules or limitations on the number of years of experience accepted by a new district when determining a teacher's placement on the salary schedule. On the other hand, first year teachers are expected to be more responsive to fiscal incentives. As new entrants to the teacher job market, first year teachers may be more apt to choose a position in a district that offers fiscal recruitment incentives, even if their choice required a move.

Using $Y1Teach$ by $Assign\ ShortArea\ Incentivized$ as a regressor for $MajorAssign\ ShortArea$ produces a positive coefficient of 0.11 that is statistically insignificant. Unfortunately the small sample size produces a large standard error of 0.07. These results provide no evidence to predict whether a district using a fiscal recruitment incentive policy is it more likely to attract first year teachers of subject shortage areas that have a major in the shortage field they instruct.

The coefficient of 0.05 on $VetTeach$ by $Assign\ ShortArea\ Incentivized$ is statistically significant (0.01) and suggests the following: if veteran teachers of subject shortage areas instruct in districts offering fiscal recruitment incentives targeting subject shortage areas, these veteran teachers are 5% more likely to have a college major in the subject they teach.

The estimate of 0.05 on $VetTeach$ by $Assign\ ShortArea\ Incentivized$ prompts one to ask how meaningful is 5%? To answer this question, a comparative calculation was made to put a 5% coefficient into perspective. Re-estimating the model by regressing $MajorAssign\ ShortArea$ on districts' starting pay for teachers with a Bachelor's degree district, thereby eliminating additional independent variables, and multiplying the coefficient by a \$10,000 salary increase produces only a 2% increase in the recruitment if these teachers. The 5% coefficient on $VetTeach$ by $Assign\ ShortArea\ Incentivized$ offers guidance to policymakers when deciding whether fiscal recruitment policies to attract teachers to hard-to-staff subjects are valuable. Targeted fiscal recruitment incentives have a greater effect on attracting high quality teachers to instruct subject shortage areas than significant across-the-board salary increases.

Results from the subject area major regression model indicate district fiscal recruitment policies for shortage fields increase the likelihood of a district attracting more high quality teachers

when the district uses fiscal incentive policies than when the same district does not have this type of policy. When a districts uses such a policy, a larger proportion of veteran teachers of shortage fields are predicted to have a major in their field of instruction.

Summary

Data from four cycles of SASS 1990 through 2004 explore the relationship between district fiscal incentives for recruiting teachers of subject shortage areas and two groups of full time teachers: nontraditional teachers newly entering the teaching profession and teachers with a college major in the subject shortage area they instruct.

Regression analysis predicts whether districts offering subject shortage area recruitment incentives attract greater proportions of first, year, full time nontraditional teachers. Are districts likely to expand the teacher labor market by attracting more nontraditional teachers when districts offer fiscal recruitment incentives for subject shortage areas? The evidence presented in this study suggests yes.

A second regression model explores whether a district is predicted to attract more teachers with a major in the subject shortage area they instruct when the district uses economic fiscal incentives to recruit shortage field teachers than when the same district does not use such incentives. Analysis findings suggest when a district is using a fiscal recruitment incentive, the district is likely to attract more high quality teachers, and larger proportions of veteran teachers of shortage fields are predicted to be high quality teachers. Analysis of the impact of these policies on first year teachers of shortage fields finds no effect.

Findings from this study provide policymakers with longitudinal and quantitative data to gauge the impact district fiscal incentive policies have on the teacher labor market. Federal and state initiative designed to broaden the pool of qualified teachers to fill vacancies in hard-to-staff subjects and to attract more high quality teachers of shortage fields to districts with staffing challenges.

CHAPTER V

Impact of Incentives on Teachers' Salaries

Introduction

Described in this chapter are the data and sample from SASS used to investigate the impact of district fiscal recruitment incentives on teachers' salaries. A description of how variables in this study are measured and of the methodology conducted with estimation of teachers' salary equations is also included. Finally, analysis findings are presented.

Estimating salary equations for teachers of shortage fields working in districts offering fiscal rewards to recruit this type of teacher is intended to reveal how much more their districts pay them. Teachers' additional earnings above their base pay, earnings that potentially include district fiscal recruitment rewards, serve as the dependent variable. These additional earnings are regressed on full time teachers of shortage fields with a total of 10 years or less of teaching experience. The limitation on teachers' total years of experience is due to inconsistencies in SASS questionnaires.

Data and Sample

District and teacher data for estimating teachers' salary equations are taken from the four SASS cycles 1990 through 2004 that served as the data source for the regression analysis. Included in the analysis sample for estimation of teacher salary equations are the 319 districts with plausible response patterns and full time teachers with ten years or less of teaching experience that have a Bachelors as their highest degree (n=6294) or a Masters as their highest degree (n=2459). Teachers in this analysis sample are not limited to those instructing subject shortage areas, as is the case for the second regression model's analysis sample. Rather, teachers in this sample are limited to those with ten years or less of teaching experience, a limitation resulting from constraints imposed by inconsistencies in the SASS questionnaires across years. Teacher salary variables need to be created in order to estimate teacher salary equations as SASS questionnaires do not account for all increments of teaching experience that determine a

teacher's salary. However, they can only be created for teachers with ten years of teaching experience or less as not all waves of SASS have questions for other combinations of years of teaching. Details of the creation of the teacher salary variables are described in the methodology section of this chapter.

Methodology

Salary equations are estimated for teachers with a teaching assignment in a shortage field for which their districts offer economic recruitment incentives (Assign ShortArea Incentivized). In this model, Assign ShortArea Incentivized is the independent variable, and the salaries of these teachers are estimated to determine how much additional earnings their districts gave them. Any additional earnings may be indicative of the teachers receiving a district fiscal recruitment incentive, as all of these teachers work in districts incentivizing the recruitment of this type of teacher. Created variables representing additional earning of these teachers are the dependent variables. Details of how the salaries of these teachers are estimated and how the dependent variables are created are described below.

In the estimations of teachers' salary equations, the ideal dependent variable would be fiscal recruitment incentives received by teachers. But, a limitation of SASS is a lack of survey questions specifically identifying whether a teacher received a fiscal recruitment incentive, and if so, the dollar amount of the incentive exclusive of other additional income. SASS teacher respondents are asked if they earned income from any other school sources during the current school year, such as a merit pay bonus, state supplement, etc., and if so, the dollar amount.²¹ The wording of this question prohibits identification of teachers whose source of additional income is attributable to a fiscal recruitment incentive.

To overcome the limitations of SASS questions, a salary variable is constructed to identify teacher recipients of district fiscal recruitment incentives and the size of the incentive with a process similar to one formulated by Ballou (2001) in his research of merit pay for

²¹ The teacher survey question regarding income from other school sources for each of the four SASS cycles reads:
1990-91 "Have you EARNED income for any other school source this year, e.g., a bonus, state supplement, etc.?"
1993-94 "Have you earned income for any OTHER source this year, e.g., a merit pay bonus, state supplement, etc.?"
1999-00 "Have you earned income for any OTHER school sources this year, such as a merit pay bonus, state supplement, etc.?"
2003-04 "During the current school year, have you earned income from any OTHER school sources, such as a merit pay bonus, state supplement, etc.?"

teachers. Using salary schedule data from SASS, Ballou approximated the size of merit pay districts awarded teachers. With an adaptation of Ballou's process, this research calculates the difference between a full-time teacher's self-reported salary and the district's base salary- any teacher earnings above the district base pay would be attributable to additional income from other sources, including fiscal recruitment incentives.

Calculating Teachers' Additional Earnings Above District Base Pay

Calculation of full time teachers' additional earnings above their base pay is seemingly straightforward as SASS included variables for teachers' salaries and district base pay for teachers. However, the SASS district base pay variable does not fully account for the step and lane district salary schedule that traditionally uses teachers' highest degree and total years of experience in determination of their base pay. Common to all four SASS cycles are district questions regarding base pay for teachers with a Bachelor's degree and no experience or ten years of experience. Although all SASS survey years ask districts their base pay for teachers with a Masters degree and no experience, only SASS survey year 2003-04 inquires about base pay for a teacher with a Masters and ten years of experience. Other combinations of district pay for high degrees and years of experience were not common across all four SASS cycles.

Ideally, SASS would ask district respondents the base salary paid to full time teachers at each incremental increase in years of experience in conjunction with teachers' highest degrees. While SASS does not provide such data, a reasonable estimate of district base pay for teachers with various years of teaching experience is constructed with a multistep process explained below. For explanatory purposes, the multistep process utilizes SASS salary variables for teachers with a Bachelor's as their highest degree; additional research for teachers with a Master's as their highest degree requires the process to be replicated, substituting the appropriate SASS variables in lieu of Bachelor's degree variables.

First, the district salary increase paid to a teacher for each additional year of experience was estimated with two SASS variables: 1) district base pay for a teacher with a Bachelor's and ten years of experience; and 2) district base pay for a teacher with a Bachelor's and no experience. The difference between these two variables was calculated and divided by ten years of teaching experience. Next, this dollar amount was multiplied by a teacher's total years of

experience, and added to the district base salary for a teacher with no experience and a Bachelor's degree. The result is a constructed district base pay variable accounting for all yearly increments of teachers' experience.

The constructed district base pay variable is used to calculate teachers' additional earnings above their base pay, earnings that include fiscal recruitment incentives teachers may have received. Subtracting the constructed district base pay variable from teachers' self-reported base pay plus income from other sources produces a salary discrepancy variable. The salary discrepancy variable represents teachers' additional earnings above their base pay and is used as the dependent variable.

Before proceeding, it is necessary to clarify what income from "other" school sources means in this context by reviewing the sources of income already addressed in preceding teacher survey questions. For all survey years, prior to responding to the question referring to earning income from other school sources, teachers are asked if they received earnings from the following sources: teaching summer school, working in a non-teaching job in a school system, working in a non-school job, or extracurricular duties (such as coaching or sponsoring a student activity). They are also asked the dollar amount of these earnings, as well as the amount of their academic base salary for the school year. After responding to these questions, teachers are asked about earning income from other school sources, with listed suggestions of "merit pay bonus, state supplement, etc." for all survey years other than 1990-91.²² The wording for the listed suggestions for 1990-91 excludes the term "merit pay." The respondents are also asked the dollar amount of the additional income.

Additional salary discrepancy variables for teachers that do not report additional income above their base pay are created with a near identical process of subtracting district base pay from teachers' self-reported base pay. The justification for calculating salary discrepancies for teachers reporting no additional income above their base pay stems from inconsistencies in the survey data for teachers' self-reported base pay. As describe in the preceding paragraph, SASS asks teachers multiple questions regarding the source and dollar amount of their income, and one of these

²² The teacher survey question regarding income from other school sources for each of the four survey cycles reads:
1990-91 "Have you EARNED income for any other school source this year, e.g., a bonus, state supplement, etc.?"
1993-94 "Have you earned income for any OTHER source this year, e.g., a merit pay bonus, state supplement, etc.?"
1999-00 "Have you earned income for any OTHER school sources this year, such as a merit pay bonus, state supplement, etc.?"
2003-04 "During the current school year, have you earned income from any OTHER school sources, such as a merit pay bonus, state supplement, etc.?"

questions asks teachers to report the dollar amount of their academic year base teaching salary. Although the intent of this question is for teachers to report only their base pay and no other income, an inspection of the teachers' responses show teachers reporting base pay in amounts exceeding what their districts report as teachers' base pay. Such inconsistencies may be the result of teacher response error, as teachers may have forgotten they were receiving additional income and inadvertently reported only receiving base pay. Because all of the teachers included in this regression model work in districts acknowledging a fiscal recruitment policy, salary discrepancies for teachers who report receiving and not receiving additional income are considered additional earnings that may be attributable to a fiscal recruitment incentive.

A total of four salary discrepancy variables are constructed and account for teachers with a Bachelors or a Masters as their high degree. The four salary discrepancy variables serve as dependent variables in the estimation of teacher salary equations: Salary Discrep Plus Other Income Bach, Salary Discrep Plus Other Income Mast, Salary Discrep Bach, and Salary Discrep Masters. Each salary discrepancy variable is regressed on the binary coded independent variable identifying teachers with their teaching assignment in a subject shortage area their districts target with economic recruitment rewards (Assign ShortArea Incentivized).

Table 18 summarizes the independent variable, Assign ShortArea Incentivized, as well as a related variable, Assign ShortArea, defined as teachers instructing a subject shortage area. Although Assign ShortArea is not specified in the estimations of teachers' salaries, a comparison of frequency data for Assign ShortArea and Assign ShortArea Incentivized helps gauge the magnitude of Assign ShortArea Incentivized. Of the 2,459 teachers with a Masters as their high degree included in the analysis sample, 44.1% instruct a subject shortage area (Assign ShortArea), but just 11% of teachers with a Masters as their high degree instruct shortage fields in districts offering incentives to recruit teachers of shortage fields (Assign ShortArea Incentivized). Teachers with a Bachelors as their high degree number 6,294 in the analysis sample, of which 36.5% instruct shortage areas (Assign ShortArea), and only 9.3% instruct subject shortage in districts with fiscal incentive recruitment policy for subject shortage areas (Assign ShortArea Incentivized).

Table 18
 Incidence of Teachers Instructing Shortage Fields in Districts Not Offering Fiscal
 Recruitment Incentives for Shortage Fields (Assign ShortArea) and in Districts
 Offering Fiscal Recruitment Incentives for Shortage Fields (Assign ShortArea Incentivized)
 SASS Cycles 1990-2004

-All Teachers Work in Districts with Plausible Patterns for Fiscal
 Recruitment Incentive Policies for Subject Shortage Areas
 -All Teachers' Total Years Teacher Experience 10 years of less

Variables	Teachers High Degree Bachelors n=6294		Teachers High Degree Masters n=2459	
	Frequency	Percent	Frequency	Percent
Assign ShortArea	2300	36.5	1085	44.1
Assign ShortArea Incentivized	588	9.3	270	11.0

Source: Schools and Staffing Survey, various years. Public School District and Teacher Surveys.

Control variables are introduced so the coefficient for Assign ShortArea Incentivized is not confounded by the effect of other variables related to teachers' salaries. These include a teacher's total years of full time teaching experience, districts offering a fiscal recruitment incentive for hard-to-staff locations, and an interaction term for district fiscal recruitment incentives for hard-to-staff locations by district percentage of minority students.

Findings

What impact do district fiscal recruitment incentives have on teachers' salaries? Results from salary estimation for teachers of subject shortage areas working in districts offering fiscal recruitment incentives to attract these teachers find little meaningful evidence of fiscal recruitment incentives in teachers' salaries. A detailed description of findings for the estimated teachers' salary equations findings is presented below.

Do the salaries of subject shortage area teachers working in districts offering fiscal recruitment incentives provide evidence of these teachers receiving a monetary reward? If so, what is the dollar amount of the fiscal recruitment incentive?

Salary equations are estimated for the teachers instructing shortage fields which are incentivized by their districts (Assign ShortArea Incentivized) to find evidence of fiscal recruitment incentives and the dollar amount of the incentives. Four dependent variables reflecting teachers' additional earnings above their expected base pay are regressed on the binary coded independent variable Assign ShortArea Incentivized. The four dependent variables include Salary Discrep Plus Other Income Bach, Salary Discrep Plus Other Income Masters, Salary Discrep Bach, and Salary Discrep Masters. Table 19 shows the findings for Salary Discrep Bach and Salary Discrep Masters, dependent variables created with teachers' self-reported base pay exclusive of additional income. Also shown in Table 19 are results for the dependent variables Salary Discrep Plus Other Income Bach and Salary Discrep Plus Other Income Masters, which were constructed using teachers' self-reported base pay plus other income.

The coefficients for Assign ShortArea Incentivized are small and statistically insignificant when regressed on salary discrepancies for teachers with Master's degrees, providing no evidence of fiscal recruitment incentives nor the dollar amount of the incentives. If teachers with a Master's degree are receiving fiscal recruitment incentives, the dollar amount of the incentive is probably too small to be meaningful. Salary equation estimates for both Salary Discrep Masters and Salary Discrep Plus Other Income Masters result in this finding.

For salary discrepancies for teachers with a Bachelor's as their high degree, findings are slightly different for Salary Discrep Bach and Salary Discrep Plus Other Income Bach. The coefficient on Assign ShortArea Incentivized is statistically significant as a regressor for Salary Discrep Bachelors yet insignificant as a regressor for Salary Discrep Plus Other Income Bachelors. However, although the estimate on Assign ShortArea Incentivized is statistically significant as a regressor for Salary Discrep Bachelors, the coefficient is surprisingly a negative 468.0. This small estimate, particularly because it suggests a negative dollar amount of additional income for teachers of subject shortage areas, indicates evidence of fiscal recruitment incentives cannot be found in teachers' salaries.

There are several factors that could be contributing to the small, negative estimate for Assign ShortArea Incentivized. There may be too much noise in the salary data. For example, when constructing the district base pay variable to account for all increments of teachers' experience,

concerted efforts were made to control for potential error. However, it is possible there were districts' with base pay amounts that deviated so far from the average district base pay amounts that their deviations contributed noise to the salary data. Or, perhaps if the dollar amount of the fiscal incentive had been larger it would have contributed to a more meaningful estimate.

Results from the two regression analysis suggest that fiscal incentive policies are having an effect on recruitment. However, if districts are, in fact, offering fiscal recruitment incentives in dollar amounts that are not meaningful enough to be found in teachers' salaries, perhaps other district characteristics are attracting teachers rather than the size of a fiscal incentive.

Table 19
Findings for Estimated Teachers' Salary Equations
SASS Years 1990-2004

(Dependent Variables: Salary Discrepancy Bachelors
Salary Discrepancy Plus Other Income Bachelors
Salary Discrepancy Masters ***
Salary Discrepancy Plus Other Income Masters ***)

	Salary Discrep Bach	Salary Discrep Plus Other Income Bach	Salary Discrep Masters	Salary Discrep Plus Other Income Masters
Independent Variables	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
Assign ShortArea Incentivized	-468.0* (265.6)	-388.7 (269.6)	525.4 (802.9)	476.1 (808.1)
Total Teaching Experience	58.0 (38.0)	63.6 (38.5)	164.2 (123.9)	184.1 (124.7)
District Offers Location Incentive	860.3** (239.4)	959.2** (243.0)	1183.6 (794.8)	1345.8 (800.0)
District Offers Location Incentive By Percent Minority	-11.4** (2.0)	-11.3** (2.1)	-17.7** (6.9)	-17.4** (7.0)

Source: Schools and Staffing Survey, various years. Public School District and Teacher Surveys.

* significant at .05

** significant at .01

*** Analysis only for SASS cycle 2003-2004

Summary

When teacher salary equations are estimated for subject shortage area teachers working in districts offering monetary rewards to recruit these teachers, is there evidence of a fiscal incentive in the teachers' salaries? If so, what is the magnitude of the incentive? Results indicate no evidence of a fiscal incentive for teachers with a Bachelors or a Masters as their high degree as the dollar amount is not only small but also negative. Although regression analysis findings suggest fiscal recruitment incentives are having a positive impact on teacher recruitment, meaningful evidence of financial incentives in teachers' salaries cannot be found.

CHAPTER VI

Conclusion and Suggestions for Future Research

Few empirical investigations have examined whether district fiscal recruitment policies affect the recruitment of teachers despite the increasing prevalence of such policies at the federal, state, and local levels. Findings from this study suggest district fiscal incentives have an impact on teacher recruitment.

Longitudinal analysis of descriptive SASS data shows the number of nontraditional teachers entering the teacher labor market is increasing over time, especially in the shortage fields of math and science. Large proportions of these teachers work in urban districts, and districts with high levels of minority students and students in poverty. Similar trends occur in districts offering fiscal recruitment incentives. Overall, the number of districts providing shortage incentives increases with each sequential SASS cycle, with special education and math the subject shortage areas most often rewarded with recruitment incentives. Percentages of districts offering recruitment incentives for hard-to-staff locations grow as the districts' levels of minority students and students in poverty increase. Math experienced the largest growth rate for district economic recruitment incentives as the proportion of districts offering recruitment incentives for this subject tripled during the fourteen-year SASS period. Urban districts offered fiscal recruitment rewards to attract teachers of shortage fields at rates four times greater than suburban districts and eleven times greater than rural districts between 1993 and 2004. These patterns and trends are consistent with the intentions of federal and state initiatives that promote and fund teacher recruitment strategies to attract better qualified teachers to hard-to-staff subjects and locations.

Quantitative analysis of SASS indicates districts offering financial rewards to attract teachers to instruct shortage fields are likely to increase their recruitment of nontraditional, first year, full-time teachers by 2%. These incentives are also predicted to positively affect the recruitment of high quality teachers of shortage fields, with high quality measured as teachers with a major in their field of instruction. Analysis results indicate when a district switches from not having a fiscal recruitment policy for subject shortage areas to adopting such policy, among the veteran teachers 5% more are predicted to have a major in the subject shortage field they

instruct. Salary equation estimations for teachers of subject shortage areas find corroborating evidence of fiscal recruitment incentives in the salaries of these teachers when they work in districts offering financial incentives. However, the dollar amount of what is potentially a fiscal recruitment incentive is not only too small to be meaningful, but also, surprisingly negative.

The trends and patterns in the SASS demographic data, coupled with the analysis findings, provide policymakers with convincing, quantitative evidence suggesting fiscal recruitment policies are broadening the pool of teachers and attracting better qualified teachers. Yet, this study does not address a number of important policy questions due to data limitations within SASS. For example, questions about the impact of fiscal recruitment policies on veteran, nontraditional teachers remain unanswered. This type of recruitment strategy may affect veteran, nontraditional teachers who have experience navigating the teacher labor market differently than nontraditional teachers who are new entrants to the teaching profession. If the numbers of nontraditional teachers participating in the teacher workforce continue to increase, the importance of gaining insight into the relationship between fiscal recruitment rewards and veteran, nontraditional teachers will be magnified. Hopefully future SASS cycles will collect data permitting the identification of veteran, nontraditional teachers so the scope of continued research on this important topic can be expanded beyond first year, nontraditional teachers.

An unresolved question with significant policy implications is what magnitude of economic incentives will entice more high quality teachers to instruct hard-to-staff subjects. In a constricted teacher labor market, where high quality teachers are in demand, teachers with subject matter knowledge are likely to have job opportunities in districts that do not need fiscal incentives to recruit teachers. If districts with staffing challenges in subject shortage areas, particularly those in hard-to-staff locations, are to be competitive in their teacher recruitment, they need to know the dollar amount of financial reward that would be most attractive for recruiting high quality teachers. Additional waves of SASS may afford this opportunity if SASS were to ask districts that report offering fiscal recruitment incentives to also report the dollar amount of the incentives, as well as specifically asking teachers if they received a recruitment incentive and the dollar amount of the incentive exclusive of other income. This information would aid researchers and policymakers in evaluating whether district economic incentives are a token dollar amount having little effect on teacher recruitment or a sum substantial enough to meaningfully impact districts' teacher recruitment efforts.

This study quantifies the impact of district fiscal incentive policies on teacher recruitment, and provides a foundation for future research. While many questions are answered by this research, analysis findings confirm there is much to learn about the effects of district fiscal incentive policies on the teacher labor market. Adding a qualitative component to this study would help policymakers gain insight into how to maximize the effectiveness of this resource. Qualitative investigations at the district and school level would provide data for conducting a cost-benefit analysis of district fiscal recruitment policies. Face-to-face interviews with district and school personnel that have used these recruitment policies are sources of vital information for answering questions regarding the effectiveness of economic incentives for recruiting teachers. How many nontraditional teachers have been recruited to these districts and schools? What are the characteristics of the nontraditional teachers? Are these policies recruiting more high quality teachers? Do these districts and school recruit more veteran teachers with such policies? What is the dollar amount of the fiscal incentive districts reward to subject shortage area teachers? These same questions are the motivation for this quantitative research- investigating them qualitatively will help policymakers craft more effective policies for recruiting better qualified teachers to hard-to-staff subjects and locations.

APPENDIX

Table 1A: Variable Definitions: SASS Public School Teacher Survey, Various Years

VARIABLE	DEFINITION
Full-Time, Public School Teaching Experience	Years of Teaching Experience
Part-Time, Public School Teaching Experience	Years of Teaching Experience
Private School Teaching Experience	Years of Teaching Experience
Subject Shortage Area	Teacher's Subject Area (math, science, special education, foreign language, bilingual education, or vocational technical education)
Race/Ethnicity	Race/Ethnicity (Black, Native American Indian, Caucasian, Hispanic)
Gender	Gender (male, female)
Age	Age (20-29, 30-39, 40-49, 50-59, 60-79)
Bachelor Major	Teacher's Bachelor Major (math, science, special education, foreign language, bilingual education, or vocational technical education)
Activity Last Year (survey years 2003-04 and 1999-00), Activity Before Becoming Teacher (survey years 1993-94 and 1990-91)	Self-reported Activity Last Year (student at a college or university, caring for family member, teaching at a college or university, unemployed and seeking work, substitute/other [survey years 1993-94 and 1990-91], working in occupation outside education, military service, retired from another job)
Grade Level of Students Taught by Teacher	Elementary or Secondary
Master's Degree	Yes/No
General Field of Main Teaching Assignment	Main Teaching Assignment (elementary, special education, bilingual education, foreign language, math, science)
Union Member or Employee Association Similar to Union (survey years 2003-04 and 1999-00)	Yes/No
Average Salary	Reported in Dollars
Additional Salary Received for Bonus or Merit Pay	Reported in Dollars

Table 2A: Variable Definitions: SASS Public School District Survey, Various Years

VARIABLE	DEFINITION
Urbanicity of District	Urban, Suburban, Rural, Other
Percent Minority Students in District	Less than 25% (Low), Greater than 25% and less than 50% (Medium), Greater than 50% (High)
Percent of Students in District Approved for National School Lunch Program	Less than 25% (Low), Greater than 25% and less than 50% (medium), Greater than 50% (High)
Salary Schedule for Teachers	Yes/No
Salary Schedule Starting Amount	Starting salary in dollars for first year teacher with no credits for prior professional experience
District Incentives - Shortage Fields	District currently uses pay incentives to recruit or retain teachers to teach in shortage fields
District Incentives - Math	District offers pay incentives to recruit or retain teachers to teach in math
District Incentives - Physical Science	District offers pay incentives to recruit or retain teachers to teach in physical science
District Incentives - Biology/Life Science	District offers pay incentives to recruit or retain teachers to teach in biology/life science
District Incentives - Special Education	District offers pay incentives to recruit or retain teachers to teach in special education
District Incentives - Foreign Language	District offers pay incentives to recruit or retain teachers to teach in foreign language
District Incentives - Bilingual Education/ ESL	District offers pay incentives to recruit or retain teachers to teach in bilingual education/ESL
District Incentives - Vocational Technical Education	District offers pay incentives to recruit or retain teachers to teach in vocational or technical education
District -Teachers Union Agreement (survey years 2003-04 and 1999-00)	District has agreement with a teachers' union or organization for the purpose of collective bargaining or meet-and-confer discussions

Table 3A: Variable Definitions: SASS Public School Survey, Various Years

VARIABLE	DEFINITION
Teaching Vacancies	For this school year (2003-04, 1999-00, 1993-94, 1990-91), there were teaching vacancies for which teachers were recruited and interviewed.
Difficulty of Filling Teacher Vacancies in Field of Math	For schools that had vacancies for which teachers were recruited and interviewed, difficulty of filling position in field of math. (No positions in this school, no vacancy in this field, easy, somewhat difficult, very difficult, could not fill the vacancy)
Difficulty of Filling Teacher Vacancies in Field of Physical Science	For schools that had vacancies for which teachers were recruited and interviewed, difficulty of filling position in field of physical science. (No positions in this school, no vacancy in this field, easy, somewhat difficult, very difficult, could not fill the vacancy)
Difficulty of Filling Teacher Vacancies in Field of Biology/Life Science	For schools that had vacancies for which teachers were recruited and interviewed, difficulty of filling position in field of biology/life science. (No positions in this school, no vacancy in this field, easy, somewhat difficult, very difficult, could not fill the vacancy)
Difficulty of Filling Teacher Vacancies in Field of Special Education	For schools that had vacancies for which teachers were recruited and interviewed, difficulty of filling position in field of special education. (No positions in this school, no vacancy in this field, easy, somewhat difficult, very difficult, could not fill the vacancy)
Difficulty of Filling Teacher Vacancies in Field of Foreign Language	For schools that had vacancies for which teachers were recruited and interviewed, difficulty of filling position in field of foreign language. (No positions in this school, no vacancy in this field, easy, somewhat difficult, very difficult, could not fill the vacancy)
Difficulty of Filling Teacher Vacancies in Field of Bilingual Education/ESL	For schools that had vacancies for which teachers were recruited and interviewed, difficulty of filling position in field of bilingual education/ESL. (No positions in this school, no vacancy in this field, easy, somewhat difficult, very difficult, could not fill the vacancy)
Difficulty of Filling Teacher Vacancies in Field of Vocational Technical Education	For schools that had vacancies for which teachers were recruited and interviewed, difficulty of filling position in field of vocational or technical education. (No positions in this school, no vacancy in this field, easy, somewhat difficult, very difficult, could not fill the vacancy)

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