STAFFING CLASSROOMS: DO TEACHER HIRING PRACTICES AFFECT TEACHER QUALIFICATIONS?

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Abstract

Decades of research on the determinants of student achievement make it clear that high quality teachers matter for student success. Despite the recent focus on teacher quality, relatively little research exists on district practices to recruit, screen and select teachers. This paper takes a first step in filling this gap by documenting some of the key findings on teacher recruitment and selection practices from a survey on teacher hiring practices in New York State school districts. In addition, we have done an exploratory analysis of teacher hiring practices are related to variation in teacher qualifications across school districts in New York.

While most districts continue to use fairly traditional methods to recruit teachers, a much smaller share of districts use methods such as recruiting incentives to attract a wider pool of teachers, or approaches to expand the local supply of teachers. We find that the use of recruiting incentives, such as subsidized tuition at local colleges, or extra compensation for National Board certification, or extra-curricular activities, are associated with more qualified teachers in a district. By contrast, strategies to increase local supply of teachers may be either unrelated or negatively related with the level of teacher qualifications.

Districts typically ask for a standard set of material from teachers, and consider a limited set of factors in screening and selection. We found that academic criteria (certification exam scores, quality of the certificating institution, quality of teaching portfolios, and MA degrees) are less frequently cited as important in teacher selection than willingness to participate in extra-curricular activities. Of these criteria, teaching portfolios, and sample lessons, were found to be positively related to stronger teacher qualifications in a district.

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Decades of research on the determinants of student achievement make it clear that high quality teachers matter to student success (Ferguson, 1998; Goldhaber, 2002; Goldhaber et al., 1999; Hanushek et al., 2002). With states under pressure to raise teacher quality to comply with NCLB and with a significant increase in demand for teachers projected for the next decade (Hussar, 1999), many school districts face significant teacher recruitment challenges. Most of the research on teacher labor markets has focused on how salaries and working conditions affect teacher location decisions. The policy debate has tended to focus on state-level policies to encourage new teacher candidates, or teachers to work in hard to staff schools or fields.

Despite the concern that differences in school district hiring processes may contribute to the teacher quality problem (Loeb, 2000), the research documenting the use of particular hiring practices, let alone evaluating their effectiveness, is very limited. This paper starts to fill this research gap by presenting results from a recent survey on teacher hiring practices used in New York school districts, and analyzing whether these practices are related to the qualifications of recently hired teachers. Since we have discussed survey results for recruitment practices elsewhere (Balter and Duncombe, 2005a), the focus of the paper will be on "emerging" recruitment practices, and practices used in the selection of teacher candidates.

The paper is organized into five sections. In the first section of the paper, we review the limited empirical research on teacher hiring policies of school districts. The second section describes survey design and implementation and analyzes our sample's representativeness of all districts in New York. In the third section, we present descriptive results from the survey for emerging recruitment practices, and practices used in teacher selection. We then discuss the

approach used to develop a measure of teacher qualifications, and present exploratory regression results examining the relationship between teacher qualifications and hiring practices. Finally, we summarize the results and discuss policy implications.

Research on Teacher Hiring Practices

The teacher recruitment difficulties of school districts, particularly those serving disadvantaged students, are well documented (Lankford et al. 2002). A large body of empirical research on teacher mobility confirms that compensation can significantly affect teacher decisions about leaving and moving (Baugh and Stone 1982; Murnane and Olsen 1990; Stinebrickner 1998; Imazeki 2005; Dolton et al. 1999). However, several recent studies suggest that even a policy of providing sizeable "combat pay" for working in high need schools will not by itself lead to adequate levels of high quality teachers in these schools. Hanushek et al. (2001) found that teacher mobility across schools and districts may be driven in large part by the characteristics of the students that they are teaching and less by salary differences. The findings of Boyd et al. (2004) suggest that teacher labor markets are very localized. If teachers have strong preferences for a familiar teaching environment, then it may be more effective for districts serving disadvantaged students to "grow their own" teachers than to use compensating salary differentials and geographically broad searches to fill teaching vacancies.

What is missing in the research on teacher recruitment and retention is information on what hiring practices districts actually use and whether these practices are associated with improvements in teacher qualifications. If teachers want to work in familiar teaching environments preferably close to where they grew up or went to college, then the most effective strategies for districts should be to promote increases in the local supply of teachers, using

alternative certification, and recruitment of substitutes and paraprofessionals. On the other hand, if compensation policies and recruitment incentives can influence teacher mobility, then high need districts may want to cast a wider net and try regional or national searches. Understanding this process is hindered by a lack of information on teacher hiring processes. "We know little about how effective districts are in their hiring decisions" (Loeb, 2001, 109). Concerns over the quality of the public teacher hiring process have been raised in several comparisons of teacher recruitment policies in public and private schools (Ballou, 1996; Ballou and Podgursky, 1998). Ballou (1996) argues that "public school officials undervalue cognitive skills and subject matter knowledge when screening new applicants" (p. 130).[1]

Most of the literature on recruitment in education examines teacher recruitment, training, and compensation policies in particular states, and use these case studies to make broad recommendations (The Southeast Center for Teaching Quality, 2002; Pathways to Teaching Careers, 1997; Hirsch, 2001; Fox and Certo, 1999; Education Research Service, 2001; Clewell, et al., 2000). The focus of most of this research is on potential changes in state certification and compensation policy that can increase the supply of teachers. The little evidence that does exist on actual recruitment practices of school districts suggests that districts engage in a fairly limited search for candidates. Based on a detailed survey in 1997 of superintendents, school board presidents, and teacher union presidents in Pennsylvania, Strauss et al (1998; 2000) find, for example, that 75% of districts only advertise in Pennsylvania and 17% only advertise locally. The internet was used at least sometimes by 29% of respondents, and 30% of districts had partnerships with colleges for teacher training and placement.

In screening and selection, Strauss et al. (1998, 2000) found that districts conducted between one and two interviews (44% had at least two interviews), each of which lasted between

40 and 45 minutes. Besides applications, districts most often require applicants to submit written recommendations, college transcripts, and proof of certification. First interviews cover a wide range of topics but almost always focus on managing classroom problems, discipline, experience, subject matter, curriculum, and learning styles. Only 43% of districts in Pennsylvania require candidates to teach a sample lesson as part of the hiring process. In screening and selection, respondents most frequently cited past performance in teaching, references, major in area of teaching, grade point average, and experience as important. Caliber of certificating institution, dual certification, advanced degrees, writing samples, and test scores were cited less frequently as important. Strauss et al. (2000) conclude that "insufficient emphasis is placed on content knowledge other than what is reflected in grade point averages (but not college of preparation). Performance on test scores is weighted, on average, as heavily as willingness to engage in extra-curricular activities." (p. 405).

Liu and colleagues (Liu 2002; Liu and Johnson 2003) have conducted teacher-level surveys in five states asking teachers to characterize the hiring process they experienced. Teachers in public schools were asked most frequently to submit resumes, references, college transcripts, and cover letters. Less frequently, teachers had to submit portfolios, lesson plans, and writing samples. Liu (2002) compared teacher response in public and charter schools in New Jersey and found that charter schools were much more apt to ask teachers to submit portfolios and teach demonstration lessons than public schools.

Survey Design and Implementation

While previous survey research on teacher hiring practices is valuable, these studies did not cover in depth several emerging areas in teacher hiring: the use of the internet, recruitment incentives, and strategies to increase the local supply of teachers. In addition, little information exists on the processes used for screening, interviewing, and selecting teachers by school districts. We know little about how this process differs across types of school districts. To shed some light on teacher recruitment and selection practices we surveyed New York school superintendents in the spring of 2004. To keep the survey to manageable length, we limited the survey to important practices and to emerging practices as identified in the literature. The survey was organized into three broad topics: 1) teacher recruitment, 2) teacher screening and selection and 3) interest in training and support.[2] In constructing the survey, we borrowed extensively from the surveys developed by Strauss et al. (1998) and Liu (2002).

In implementing the survey, we followed closely the recommendations of Dillman (2000) to maximize the response rate. The New York State Council of School Superintendents (NYSCOSS) endorsed the survey, put a link to the on-line survey on their website, and sent a joint cover letter with the survey. We sent four waves of mailings to superintendents over a two month period, and the survey was available in both hardcopy and online. The resulting response rate was excellent, over seventy-one percent.

To examine how representative the sample is of all school districts in New York, we compared average characteristics for districts completing the survey with those of districts not completing it (Table 1). The survey sample did not include New York City or districts serving primarily special populations. Included in our comparison are enrollment, fiscal, teacher, and region variables. Districts completing the survey have similar enrollment size and student socio-

economic composition as non-respondents. The one exception is the share of limited English proficient (LEP) students, which was higher in districts not in the survey. Regarding district finances, districts in the survey have six percent lower spending overall and three percent lower operating spending. None of the other differences in fiscal variables are statistically significant from zero. The teacher work force in responding districts is very similar to non-respondents, except that non-respondents have slightly less experienced teachers and a slightly lower share of tenured and permanently certified teachers. Respondents and non-respondents tend to be distributed evenly between urban, suburban, and rural districts; however, respondents are less likely to be located in the New York City metropolitan area (so called downstate New York).

<Table 1 about here>

Descriptive Survey Results

The high response rate and representative nature of the sample provides us the opportunity to examine in depth the teacher hiring practices of New York school districts. Due to space limitations, we have limited our analysis here to "innovative" recruitment practices, and key practices in the screening and selection process. In this section we will examine simple bivariate relationships between those hiring practices and district characteristics including enrollment size, and a composite classification for resource capacity, and student needs developed by the New York State Education Department (SED), which classifies districts into high need, average need or low need districts.[3]

Emerging Approaches for Teacher Recruitment

Districts continue to focus their recruitment efforts primarily on traditional methods in the local area; relatively few districts advertise outside the local area or work with non-local

colleges (Balter and Duncombe, 2005b). Only 5% of districts advertise frequently in out-of-state newspapers, education trade publications, or use radio or TV advertisements. Over 80% of districts work with local colleges on recruitment, but under 40% regularly work with non-local colleges. We asked superintendents to identify the "five colleges with which you conduct the greatest number of these activities."[4] Over 40% of teachers hired in the last five years in responding districts earned their bachelor degree at local colleges which had a partnership with the district, and 55% earned their masters degrees at partner colleges. If "local" colleges are defined as colleges in the same county or neighboring counties (including those in other states), close to 50% of recently hired teachers in New York earned their bachelors in local colleges, and over 70% earned their masters at local colleges.[5]

There are, however, practices that may be considered "emerging" approaches to expand recruitment efforts beyond these more traditional methods. First, the emergence of the internet provides new opportunities for expanding teacher recruitment. Second, much of the recent literature on teacher recruitment, including both policy recommendations and studies of existing state programs, has focused on using monetary recruiting incentives, alternative certification, and other strategies for increasing supply.

Use of the internet. Assuming that the teachers are willing to consider moves outside the local area, the internet has the potential to greatly expand information for teachers on available positions and for districts on teachers searching for new positions at relatively low cost compared to traditional advertising. For the cost of posting job notices on teacher recruitment websites, assuming such sites are available, a district can potentially have access to a national market of teachers. Districts can post job notices on their own websites and can provide recruiting brochures online for candidates to download. Prospective teachers can communicate with the

districts by email and can even submit their applications online. However, there may be significant start-up costs for designing web pages and opportunity costs associated with searching available websites.

Approximately three-quarters of districts use the internet, primarily to post job notices on the school district websites and other recruitment websites (Table 2). A much smaller share use the internet to search for job candidates. Large districts are more likely to use the internet, particularly to post jobs on district websites, allow candidates to submit online applications, and search for job candidates. In general, high need rural districts use the internet less frequently than other types of districts. High need urban districts are somewhat more likely than average need districts to use the internet, particularly for posting job openings on district websites, or teacher recruitment websites, and to search for candidates on the web. To assist particularly small districts in their use of the internet for hiring, regional education organizations, such as New York's Boards of Cooperative Educational Services (BOCES), can help to bridge this technical divide by providing recruiting services to school districts.[6] Approximately half the districts responding to the survey use hiring services provided by BOCES, particularly for online applications, and online vacancy notices, however, small districts are not more apt to use BOCES services than large districts.

<Table 2 about here>

Teacher recruitment incentives. While the use of the internet may broaden the search beyond the local area, additional incentives may be necessary to compensate for the potential monetary and psychic costs to teachers for taking a job outside their local area. A range of recruitment incentives have been discussed in the recruitment literature including signing bonuses, subsidized tuition, assistance purchasing a home, and extra compensation for hard to

staff fields and schools, National Board Certification, and extra-curricular activities and administrative duties. In addition, superintendents may be able to increase base salaries by crediting teachers for experience in other states, and non-teaching occupations. In a heavily unionized state, such as New York, it is possible that district use of recruiting incentives may be constrained by collective bargaining processes.

Almost three-quarters of superintendents responding to the survey said they used some type of recruitment incentive (Table 3). However, only two of the incentives—compensation for extracurricular activities and crediting teachers for experience outside the district—are used by almost half the districts. Perhaps these incentives are so widely used because they are less controversial and thus less likely to encounter union opposition than some others. Approximately sixteen percent of districts provide subsidized tuition at local colleges, offer additional compensation for National Board Certification, and give credit for work experience in non-teaching occupations. The only other incentive used by at least 25 school districts is additional compensation in hard-to-staff fields. The use of incentives tends to go up with district size, particularly additional compensation for National Board certification. High need urban districts are more likely than other types of districts to use incentives, particularly signing bonuses, additional compensation for National Board certification, subsidized college tuition, and additional compensation for hard-to-staff fields and/or for extra-curricular or administrative functions. It is interesting to note that these types of incentives have been recommended by numerous scholars as tools to attract high quality teachers to high need schools, particularly in urban areas (e.g. Loeb 2000; Odden and Kelley 2000; Kearney 2000).

<Table 3 about here>

Strategies to increase supply. Particularly if strategies to broaden the search outside the local area are not likely to be successful due to local preferences of teachers, districts can try to expand the pool of potential teachers in the local area. Such strategies to increase supply might include recruiting substitute teachers, retired teachers, former teachers, and alternatively certified teachers or providing assistance for paraprofessionals to become certified teachers. The first three strategies can be implemented within the existing teacher contract (assuming the teachers are certified). On the other hand, recruitment of alternatively certified teachers could be a matter of dispute with the teachers' union and assisting paraprofessionals to become teachers is a longer term strategy.

Almost ninety percent of districts use some strategy to increase supply with recruiting of substitutes being the most commonly used strategy (Table 4). Over forty percent of districts recruit teachers certified through alternative routes and twenty eight percent recruit retired teachers or provide assistance to paraprofessionals to become teachers. Only seven percent recruit former teachers. Use of supply strategies is not strongly related to district size but larger districts are more likely to recruit substitutes and to assist paraprofessionals. High need districts are not more apt to use these strategies than average need districts.

<Table 4 about here>

Screening and Selection Practices

After recruiting applicants, school district staff attempt to identify the strongest candidates in the applicant pool. The selection process involves identifying a set of selection criteria, determining the methods for assessing teacher quality, and deciding on who will participate in the process. As in most organizations (Pynes, 1997), districts typically begin the process by putting a set of applicants through a rough screen to determine which applicants do

not meet predetermined minimum requirements. In the case of education this might be applicants who aren't certified or whose test scores are too low. Once eligible candidates are identified, districts select among them using a process that might include interviews, portfolio assessments, and observations of sample lessons. Districts need to decide on what criteria will be used, and who will be involved in the selection process. Given the complex and context-dependent nature of teaching, it is unlikely that a few simple criteria will be adequate to sort out candidates likely to be strong teachers. Superintendents to describe these processes including the material requested, the areas discussed in interviews, and criteria used in the initial screening of teachers and the final selection of candidates to make offers.

Screening. We asked districts which administrative level manages the screening process. Almost half (44.9%) indicated the school level, just under one fifth (19.6%) indicated the district level, and the remaining 35.6% indicated that the management of the screening process is shared by the district and school. The screening of candidates must be performed based on information obtained from submitted application materials. Table 5 summarizes the percent of districts that require most applicants to submit specific materials with their application for a position. Almost all districts require applicants to submit application forms, college transcripts, letters of recommendation, letters of interest, resumes, and proof of certification. Approximately two-thirds of districts request writing samples and certification exam scores. Only 30% of districts require applicants to submit teaching portfolios, even though a portfolio potentially provides a good overview of a candidate's experience and skills. High need districts are more apt to request certification exam scores and letters of recommendations than low need districts, but are not more likely to request writing samples or teaching portfolios.

<Table 5 about here>

We are also interested in the importance districts place on various criteria in determining which applicants will be granted interviews. Almost all districts consider certification in the subject to be taught, major in the subject to be taught, and references/recommendations when screening applicants (Table 6). The slightly lesser importance placed on experience may be due to the fact that districts are often hiring from a pool of recent graduates. There are some surprises on the list as well. A much smaller share of districts consider the applicant's certification exam scores, grade point average, caliber of certificating institution, and quality of teaching portfolio in the screening process. High need urban districts are at least as likely to consider these academic criteria as average need or low need districts. They are also much more likely to consider the residence of the teacher and to use pre-screening tests in screening applicants.

<Table 6 about here>

Interviewing. The average school district conducts 2.37 interviews with a candidate before deciding whether or not to make an offer of employment (Table 7). This is one interview per position more than found by Strauss et al. (1998) and Liu and Johnson (2003) in their surveys of several states. Almost all districts (93%) conduct a second interview, and almost half (43%) conduct a third interview, but only a small number of districts (4%) report conducting more than three interviews. This number of interviews increases with the size of the district, but the length of interview is shorter in high enrollment districts. Low need districts average 2.7 interviews, but they are substantially shorter than other districts. High need urban districts spend the least total amount of time (number of interviews times average length) interviewing job candidates, although the differences are not large.

<Table 7 about here>

A range of district-level and school-level personnel is involved in the interview process; the composition of the interview team is related to district characteristics. In small districts, an interview team almost always includes the superintendent, principal, and teachers, and to a lesser extent school department heads, assistant principals, and district-level curriculum directors if the district has these positions. As the district gets larger, the roles of the superintendent, principal, and teachers, are frequently delegated to human resource (HR) directors, assistant principals, and school department heads.

We asked districts to indicate which topics are discussed with candidates during the interview process.[7] Table 7 shows the share of districts reporting that these topics are covered at some point during the process with most or all candidates. A majority of districts discuss each of the topics, however a few are covered by far fewer districts than the rest. Diversity is only discussed by 64% of districts and willingness to serve on committees and willingness to participate in extra-curricular activities are discussed by 70% and 73%, respectively. Approximately half of the districts require candidates to teach a sample lesson during the interview process. Topics covered in the interview process differ depending on district socioeconomic characteristics. High enrollment districts are most likely to require a sample lesson and less likely to discuss professional career goals, willingness to serve on committees, and extra-curricular activities. High need urban districts cover a very similar set of topics in interviews as average need districts. Low need districts are much less likely to discuss committee service or involvement in extracurricular activities than other districts. Even controlling for enrollment, high need rural districts are the least likely to require the teaching of a sample lesson.

Selection. The last step in the hiring process that we asked about is the selection of candidates to whom districts offer teaching jobs. The management of this stage of the hiring

process is mostly shared across district and school administrative levels (60%) with just under a third of districts (33%) managing it at the district level and only 6.8% at the school level. The superintendent is most likely to be involved in selection in those districts where the selection process is managed at the district level, although superintendents are very involved in the selection decision in the vast majority of districts. School level personnel—principals, assistant principals, and school department heads—are more likely to be involved in districts where the process is managed at the school level. However, principals are key decision-makers even when the process is organized at the district level.

We asked districts about the importance they place on a variety of criteria in their selection process.[8] Table 8 shows the share of districts indicating that each criterion is important or very important in the selection of candidates to whom they offer employment. The most important criteria are certification in the subject to be taught, major in the area of teaching, references/recommendations, and subject knowledge demonstrated in interviews. The least important are pre-screening tests and residence in the school district. Similar to Strauss et al. (1998), we found that academic criteria (certification exam scores, quality of certificating institution, quality of teaching portfolios, and MA degrees) are less important than willingness to participate in extra-curricular activities. Districts are very consistent in the importance they place on these items in the screening process and selection process. Very few districts rated items as important in only screening or only selection, instead, if they rated an item as important at all, it was important in both.

<Table 8 about here>

Selection criteria differ across types of districts. Grade point average, contribution to workforce diversity, performance in teaching the sample lesson, and the subject knowledge

demonstrated in the interview become more important as district enrollment increases. Willingness to be involved in extra-curricular activities becomes less important as enrollment increases. High need urban districts are more apt to consider workforce diversity and residence in the district than other districts. Low need districts are more apt to include sample lessons in the interview process and to consider them as important in selection.

Teacher "Qualifications" and District Hiring Practices

If teacher quality is important, and difficult to measure, how can a district design its hiring process to attract and select the best quality candidates within its budgetary constraints? In this section we will examine the relationship between some district hiring practices, and summary measures of teacher characteristics that might be related to quality. Given the difficulty of measuring teacher quality, we begin by discussing the measure of teacher qualifications used in this study. We then will present regression results examining the relationship between the measure of teacher qualifications and the teacher hiring practices. Given the limitations of our teacher qualification measure, and the difficulty of establishing causation with cross-sectional survey results, the results should be viewed as exploratory only. While we do not find strong relationships between most hiring practices and teacher qualifications, we identify a few promising practices that may help improve the qualifications of the teaching force.

Teacher Qualifications

The importance of teacher "quality" is frequently acknowledged in the education policy literature, however measures of quality are often poorly defined and inconsistent (Goldhaber & Anthony, 2003). Recent research with micro-student data has allowed for rough estimates of the

teacher quality based on performance gains by students in a classroom over the course of the year (Stone, 1999; Sanders, Saxton, and Horn, 1997)[9] The lack of micro-student data for New York requires that we take a more indirect approach to measure teacher quality, by measuring teacher qualifications that may be related to teacher quality. However, it is important to acknowledge that even if the teacher qualifications utilized in this study are related to success in the classroom for most teachers, they are likely to explain at best only a small share of variation in teacher quality.

The extensive education production function literature has examined the association between teacher education, and experience and student performance. The general consensus is that teacher education is not strongly related to performance, but the evidence on teacher experience is mixed depending on which studies are examined (Hanushek, 1996, Greenwald, et al., 1994). While higher education in general may not be a good predictor of student performance, having a degree in certain fields, such as math and science, can be related to student performance in these subjects (Goldhaber and Brewer, 1996, 1997). Moreover, there is some evidence that subject area certification, depending on a state's licensure requirements, can serve as a proxy for subject expertise (Goldhaber and Brewer, 2000, 2001) and Darling-Hammond et al. (2001).

Other proxy measures of teacher quality that have received attention in education policy research are teacher academic proficiency, typically measured by performance on college entrance exams, or teacher certification exams, and the selectivity of the college the teacher attended. While the evidence of the association of these factors and student performance is mixed, in general, there is fairly consistent evidence of a relationship between measures of academic proficiency and teacher quality (Ehrenberg & Brewer, 1994, 1995; Ferguson & Ladd,

1996; Hanushek and Rivkin, 2004; Strauss & Vogt, 2001). Among predictors of teacher quality, the National Council on Teacher Quality (2004), identified teacher literacy and selectivity of the college attended as key predictors of a teacher's success (Snipes, et al., 2006). However, recent research by Goldhaber (2005) suggests that teacher certification exams may only explain a small percent of student performance gains.

The approach used in this study is to use information on teacher certification test score performance, certification status, and the ranking of the college the teacher received their degree to construct a composite measure of teacher qualifications. Specifically, we adopt the approach used by Loeb (2000) by using factor analysis to construct a factor score which combines the different teacher qualifications. The data for this analysis comes from the teacher certification database maintained by the New York State Education Department (SED). The database includes information on performance on teacher tests taken by all current teachers, what colleges they attended and degrees received, and for which assignments they are certified.

Since certification exams switched in the mid-1990s from the NTE exams to the Praxis exams (New York State Teacher Certification Exams, NYSTCE), we include both types of measures. For NTE exams, we use the average score on three exams, while for the NYSTCE, we use the average percent of the passing score (300), a teacher receives on two exams.[10] To determine the academic standing of the colleges that a teacher attended for either a bachelors or masters degree, we used two sets of criteria—Barrons classification of colleges, and the Carnegie classification of the selectivity of colleges based on average student entrance exam scores. If a college was classified by Barrons as highly competitive or most competitive, or identified as more selective in the Carnegie classification for undergraduate programs, it was rated as very selective for purposes of this study. We also determined the percent of a teacher's assignments

where they had different levels of certification, including permanent, provisional, temporary, transitional, no certification, or certification status unknown.[11] If a teacher had a temporary certification, no certification, or unknown certification they were classified as having a low-level of certification. While the effect of graduate education on teacher quality has been debated, we considered for one of the composite measures whether the teacher had a graduate degree.

Given that the focus of the study is on recent hiring practices, we use information for teachers with 5 years or less of experience in the district. One limitation with the teacher certification data is that it provides a snap-shot at one period of time, and thus will not include recently hired teachers, who left teaching in the district. Given the high attrition rate among new teachers, our measures of teacher qualifications may under-represent teachers most apt to leave teaching early in their career. All information is aggregated to the district level before being combined. Table 9 presents the results of the factor analysis of teacher qualifications.[12] The difference between the two factor analyses is the addition of percent graduate degree to the second analysis. The factor loadings in the first column indicate strong associations between these variables with all factors except percent temporary, transitional or no certification positively related. The factors are combined using the scoring coefficients in the second column into an overall factor score measuring teacher qualifications. The Cronbach alpha for each set of factors is close to the standard of 0.8 typically used to identify reliable measures.

<Table 9 about here>

Table 10 compares the average levels for the teacher qualifications measures by district size and the SED classification for student need and resource capacity of the district. In general, teacher qualifications tend to be lower in small districts compared to medium to large districts, particularly the share of teachers with degrees form selective colleges, certification status, and

share of graduate degrees. As well documented in teacher labor market research on New York State (Loeb, 2000; Lankford, Loeb, and Wyckoff, 2002), teacher qualifications tend to be the lowest in districts with lower fiscal capacity and a higher share of disadvantaged students. High-need urban districts had the lowest teacher qualifications, on average, followed by high-need rural districts. Average need and low need districts tend to recruit teachers with similar qualifications. While the pattern in terms of teacher qualifications tends to fit our expectations, there is significant variation within each of these classifications.

<Table 10 about here>

Hiring Practices and Teacher Qualifications

We have identified hiring practices used by school districts in New York, and have developed composite measures of teacher qualifications, however, linking practices and outcomes is much more difficult. Ideally, survey information on hiring practices and teacher qualifications would be available for several points in time, which would allow comparisons of how changes in practices are related to changes in teacher qualifications. Besides controlling for time invariant characteristics of districts, adjustment should also be made for the attrition of teachers during the study period. As one of the first studies of teacher hiring practices of school districts in New York, it is not possible at this point to use panel data methods to control for unobservable factors.

Data and methodology. Instead, we develop a model of variation in teacher quality across districts, which attempts to control for most observable factors associated with variation in teacher qualifications. Research on teacher retention and teacher labor markets suggests that four types of factors are associated with location decisions of teachers: 1) relative salaries (adjusting for cost of living); 2) characteristics of the students in the district; 3) other factors

related to working conditions, such as district, school, and class size; and 4) amentias of the area, which make it more or less attractive place to live.

Relative teacher salaries are measured as the average salaries of teachers with 1 to 5 years of experience and average education, divided by the geographic cost of education index developed by SED. The geographic cost of education index is based on average wages in similar occupations for labor market areas in New York (NYSED, 2004). While salary decisions are clearly determined simultaneously with decisions about the desired level of teacher quality, we did not find that adjusted salaries were endogenous using a Hausman test.[13] To measure student characteristics that might affect teacher perception of working conditions, we include the percent of students eligible for subsidized lunch, percent classified as limited English proficient, percent non-white, and percent of students in the district living in female-headed households. District size and pupil density are included to capture the effect of size and urbanicity on perceived working conditions and amenities.[14] Salary levels, other compensation, and working conditions are also likely to be affected by the fiscal capacity of the school district. We included measures of per pupil property wealth and per pupil income, and rates of changes for both these variables. Finally, we included indicator variables for whether a district was in a rural area or in "downstate" New York. Rural districts would generally have lower cost of living, but would face teacher recruitment challenges associated with their remote location. The opposite would be the case for downstate districts (without New York City); cost of living is high, but teachers would be more able to take advantages of amenities of the New York City area.

As a cross-sectional study, the causal direction between teacher qualifications, and decisions over what hiring practices to use in a district is not clear. Districts presumably use different practices to increase the pool of high quality applicants, and to select the best candidate

in the available pool. However, districts which traditionally have had difficulty recruiting high quality teachers may use new practices in the hopes of improving qualifications of new hires. In addition, districts with a high share of qualified teachers may have stronger management practices in general, which may result in improved hiring decisions. Thus, we need to treat the hiring practices as endogenous, and estimate the model with an instrumental variable method (two-stage least squares).

In selecting instruments, three criteria are important. First the instrument should be significantly related to the endogenous variable so that it can serve as a good proxy. Second, the instrument, if it is going to remove simultaneity bias, should not be independently correlated with the dependent variable, when the endogenous variable is included in the model. Third, the instrument should ideally be logically related to the endogenous variable. In selecting instruments the first two criteria are mandatory if the instrument is going correct the potential bias. The third criteria, while not mandatory, is desirable because it increases the face validity of the procedure. In selecting instruments we use measures of the rate of adoption of these practices by districts that share similar characteristics. Specifically, we calculate adoption rates for five categories of districts: 1) districts in the same economic development region; 2) districts in the same SED region; 3) districts with similar enrollment size and in the same need/resource capacity category; 4) districts with similar non-white enrollment shares and in the same /resource capacity category; and 5) districts in the same regional education organization (BOCES). Since BOCES may provide training services in the use of these practices, we have avoided using instruments based on adoption rates within the BOCES unless absolutely necessary. Instruments were first examined in first stage models to select instruments that are associated with the

adoption of the practice, and then tested for their appropriateness using an overidentification test (Wooldridge, 2003).[15]

Regression results for a model of teacher qualifications regressed on whether districts use additional compensation for teachers with National Board certification (certified by the National Board for Professional Teaching Standards, NBPTS) as a recruitment tool is reported in Table 11. As indicated in Table 3, approximately 16 percent of respondents indicated that they use this practice, with higher utilization in high need urban districts. The regression coefficient on the National Board certification variable suggests that use of this practice is associated with a statistically significant increase in teacher qualifications, ceteris paribus.[16] These results are consistent with the findings of Goldhaber and Anthony (2005) that National Board certified teachers are more effective. Even if the program does not improve teacher effectiveness, it can serve as a valuable signal to districts about teacher quality. With regard other variables in the model, a higher share of non-white students and districts located in the downstate New York are associated with lower teacher qualifications, and districts with higher per capita income is associated with higher teacher qualifications.

<Table 11 about here>

Table 12 reports the coefficients on other "emerging" recruitment practices. Only a few of these practices have a statistically significant positive association with higher teacher qualifications, and most of these involve the use of recruitment incentives. Use of recruitment incentives is associated with higher teacher qualifications, particularly offering tuition in local colleges, and extra-compensation for National Board certification, extra-curricular activities, experience in other districts, or non-teaching occupations. Given that these incentives are used more frequently in high need urban school districts, our results lend support to research projects,

such as that described in Snipes, et al., (2006), which are designed to assess whether "well-designed incentive strategies [can] change the supply of high-quality teachers in needy schools." (p. 3)

<Table 12 about here>

None of the strategies to increase teacher supply are associated with an improvement in teacher qualifications. While statistically insignificant, the negative coefficients suggest that strategies to increase the local supply of teachers through use of substitute teachers, retired teachers, alternatively certified teachers, or paraprofessionals may actually reduce teacher qualifications. Given that these strategies are often view as effective ways to increase the local pool of teachers, the results indicate that the effect of these practices on teacher quality should be carefully examined. With the exception of using the internet as a tool to search for teachers, we do not find that increasing recruitment on the internet is positively associated with improved teacher qualifications. In fact, use of teacher recruitment websites is negatively associated with the qualification of teachers in a district. It is not clear if this result reflects limitations of our sample and methods, or indicates a limited pool available on these websites. The principal recruitment websites used by many districts in New York are operated by a few BOCES.[17]

We also examined the relationship between selection practices and teacher qualifications. Teacher qualification are positively related to the number of interviews (but not overall interview length) used by the district, and whether the district required teachers to teach a sample lesson during the interview process (Table 13). Sample lessons are one of the more time intensive activities that districts could require in the interview process,[18] thus, this result suggests that well managed teaching demonstrations may provide important information about teacher quality.

<Table 13 about here>

We also evaluated whether criteria respondents indicated as important in teacher selection are associated with higher teacher qualifications. Of particular interest is whether criteria associated with the academic credentials of teachers are associated with selection of more qualified teachers. The results are mixed. Considerations of certification exam scores and the quality of the teaching portfolio are positively and significantly related (at 10% significance level) related to teacher qualifications. The use of pre-screening tests and the caliber of the certifying institutions are positively related to teacher qualifications, but are not statistically significant. By contrast, the importance in selection of career and professional goals, and major in area of teaching are negatively related to higher qualifications of teachers. Most of the selection criteria do not have a statistically significant relationship with teacher qualifications. The fact that several of the selection criteria are used by over 90% or under 10% of districts, probably accounts in part for lack of statistical significance.

Conclusions

The survey results have provided a rich picture of the hiring process in New York school districts. We have documented the use of a wide range of practices and how they vary with school district characteristics. While some factors, such as enrollment, appear to be consistently related to hiring practices, other factors reveal less regular patterns, suggesting that hiring practices are complex and not easily explained by socio-economic variables. In this section, we will pull together some of the conclusions that we have drawn from reviewing the results.

Districts use a wide range of practices to recruit high quality teachers. However, large districts typically use a broader search than small districts and are more apt to use “emerging” strategies. Some of the key findings on recruitment practices include:

- Approximately three-quarters of districts use the internet, primarily to post job notices on the school district website and other recruitment websites. A much smaller share use the internet to search for job candidates. Large districts are more likely to use the internet, particularly to post jobs on district websites, allow candidates to submit online applications, and search for job candidates. High need urban districts use the internet in similar rates as average and low need districts.

- Most districts use compensation for extracurricular activities and crediting teachers for teaching experience outside the district as teacher recruitment incentives. A much smaller set of districts provide additional compensation for National Board Certification (NBC), subsidized tuition at local colleges, and credit for work experience outside of teaching. Teacher contract negotiations are probably a major constraint on the wider use of recruitment incentives. High need urban districts are more likely to provide subsidized college tuition and extra compensation for NBC and teaching in hard-to-staff fields.

- Almost 90% of districts use some strategy to increase the local supply of teachers. The main strategies are recruiting substitute teachers, alternatively certified teachers, and retired teachers and providing assistance for paraprofessionals to become teachers. With the exception of providing assistance to paraprofessionals to become teachers, high need urban districts are not more likely to use other strategies to increase supply than other districts.

Districts conduct very involved screening and selection processes. As expected, the larger the district and the higher fiscal capacity of the district, the more involved the process, particularly with regard to interviewing. Some of the key findings are:

- Almost all districts require applicants to submit application forms, college transcripts, letters of recommendation, letters of interest, resumes, and proof of certification. A majority requires certification exam scores and writing samples, but only 30% require teaching portfolios. High need districts are more apt to request certification exam scores and letters of recommendation but less likely than low need districts to request writing samples.

- In choosing candidates to interview, districts most often consider certification in the subject to be taught, major in the subject to be taught, and references/recommendations as important criteria. A much smaller share consider measures of a candidates success including certification exam scores, grade point average, caliber of the certificating institution, and quality of teaching portfolio. High need urban districts consider similar criteria in screening as other districts but do put more emphasis on residence in the district and pre-screening tests.

- The average school district conducts between two and three interviews with a candidate of 30 to 40 minutes before deciding whether to make an offer of employment. This number increases with enrollment and with the fiscal capacity of the district. The vast majority of

districts discuss each of the interview topics listed in the survey, with two exceptions. Only 64% discuss issues of diversity and just 50% require candidates to teach sample lessons. High need urban districts are more likely to discuss willingness to serve on committees and less likely to discuss teaching philosophy than other districts. High need rural districts are much less likely to require a sample lesson and are more likely to discuss involvement in extra-curricular activities.

- Superintendents, followed by principals, are highly involved in the selection of candidates in all districts. The most important criteria in selecting candidates are certification in the subject to be taught, major in the subject to be taught, references/recommendations, and subject knowledge demonstrated in the interviews. High need urban districts are more apt to cite diversity of workforce and residence in the school district as important criteria. Low need districts are much more likely to consider performance in sample lessons as important. Similar to Strauss et al. (1998), we found that academic criteria (certification exam scores, quality of the certificating institution, quality of teaching portfolios, and MA degrees) are less frequently cited as important in teacher selection than willingness to participate in extra-curricular activities.

In the second part of the paper we examine which of these hiring practices are associated with districts employing more highly qualified teachers. We use a composite measure of teacher qualification, which includes certification test score performance, selectivity of the college the teacher attended, and certification status in their assignments. The lack of time series data limits our ability to use panel data methods to identify potential effects of hiring practices. Instead, the regression results should be viewed as an exploratory analysis of relationship between human resource practices of districts and the qualifications of the teachers they hire. The one consistent finding from the regression analysis is that the use of recruitment incentives, such as tuition assistance, and extra compensation for National Board certification, extra-curricular activities, and crediting of experience in other districts or fields is associated with more qualified teachers. By contrast, approaches to expand the local supply of teachers may actually reduce teacher quality. With regard to the teacher selection process, the requirement for teachers to submit portfolios, and to teach a sample lesson are associated with more highly qualified teachers. Given that evaluating portfolios and demonstrations are more time intensive, it is not surprising that a majority of districts do not consider them in the selection process. While only suggestive our results indicate that a more detailed focus on a teacher's classroom preparation and communication skills through tools, such as teaching demonstrations and portfolios, may improve the teacher selection process.

What are the potential implications of these findings for state education policymakers? First, if states want encourage the use of "innovative" recruiting practices in small rural districts, they are going to have to find a way to lower the fixed costs of recruiting that these districts face. The use of regional education organizations, such as New York's BOCES, to help districts design, manage, and implement recruitment plans may be an effective way to lower these fixed

costs. Second, state organizations need to reduce the uncertainty surrounding the benefits of adopting particularly innovative recruitment strategies. Mechanisms to do so might include funding program evaluation research to help identify which methods are successful and which are not; and supporting regional organizations to provide training and assistance in the adoption of successful strategies. Finally, in a highly unionized state, such as New York, adoption of monetary incentives will be greatly limited unless the teachers' unions are supportive. State education departments may need to play an instrumental role in presenting the potential benefits of alternative compensation programs and working with unions to identify areas of common interest.

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Table 1. Evaluation of Whether Sample Responding to Teacher Hiring Survey Is Representative of All Districts In New York[a]

	All Districts	Districts In Survey	Districts Not in Survey
Enrollment Variables:			
Enrollment (dcaadm)	2,676	2,681	2,545
Percent nonwhite enrollment	11.5	10.9	13.0
Percent Hispanic enrollment	4.5	4.1	5.3
Percent LEP students	1.4	***1.2***	***1.8***
Percent of free lunch students	29.4	29.0	30.3
Child poverty rate (2000)	11.6	11.5	12.1
Percent single mother families	6.3	6.2	6.5
Financial Variables:			
Per pupil total spending	$16,565	***$16,284***	***$17,269***
Per pupil operating spending	$14,389	***$14,256***	***$14,725***
Per pupil spending on teaching	$8,539	***$8,420***	***$8,839***
Per pupil state aid	$5,680	$5,694	$5,645
Per pupil local taxes	$7,940	$7,871	$8,115
Local property tax rate (per $1000 of MV)	17.1	15.8	20.3
Combined wealth ratio (CWR)	1.20	1.20	1.17
Per pupil income (AGI)	$142,584	$137,845	$154,467
Per pupil market property values	$657,545	$688,163	$580,604
Teacher Variables (all teachers):			
Salary	$46,465	$46,694	$45,890
Adjusted salary index[b]	1.00	1.00	1.00
Total experience	16.5	***16.6***	***16.2***
Percent with graduate degree	73.6	73.2	74.5
Percent probationary	25.4	***25.0***	***26.2***
Percent tenured	71.5	***71.8***	***70.5***
Percent female	73.6	73.5	73.8
District Classifications (percent of all districts):			
SED regions			
Large and small city districts	8.8	8.8	8.8
Upstate and downstate suburban districts	60.5	60.0	61.7
Upstate rural districts	30.2	30.5	29.5
Downstate districts	26.0	***23.8***	***31.6***
Upstate districts	74.0	***76.2***	***68.4***
Need/resource capacity categories			
High need urban districts[c]	6.0	5.5	7.3
High need rural districts	23.5	21.7	28.0
Average need districts	50.2	***54.9***	***38.3***
Low need districts	19.7	***17.2***	***25.9***

Data Sources: New York State Education Department, New York State Office of State Comptroller, U.S. Bureau of the Census, *2000 Census of Population* .

[a]Bold and italics indicates a statistically signficant difference between districts completing the survey and those not completing survey (at 5% level).

[b]Teacher salaries adjusted for years of experience and education level.

[c]Includes the categories for large cities and other high need urban districts.

Table 2. Use of the Internet for Recruitment by District Characteristics

(percent of responses)[1]

Enrollment[2]	Low	Medium	High	All Districts
District uses the internet to recruit teachers	***64.1***	***77.2***	***85.5***	75.4
Posts job openings on school district website	***37.9***	***57.2***	***76.3***	57.0
Post job openings on online recruitment websites targeted to teachers	37.9	43.9	47.4	43.0
Posts job openings on general online recruitment websites	9.2	7.2	12.5	9.4
Searches for candidates on a recruitment website	***15.7***	***13.3***	***24.3***	17.4
Allows candidates to submit applications online	***24.8***	***37.8***	***48.7***	37.1

SED Need/Resource Capacity Categories	High Need Urban	High Need Rural	Average Need	Low Need
District uses the internet to recruit teachers	***85.7***	***67.3***	***80.0***	***70.2***
Posts job openings on school district website	64.3	47.7	60.7	59.5
Post job openings on online recruitment websites targeted to teachers	57.1	39.3	44.7	40.5
Posts job openings on general online recruitment websites	10.7	8.4	11.3	7.1
Searches for candidates on a recruitment website	28.6	13.1	18.9	17.9
Allows candidates to submit applications online	***35.7***	***28.0***	***37.8***	***46.4***

[1]Bold and italics indicates that there is a statistically significant difference between the categories (10% level).

[2]"Low" is below 30th percentile, "medium" is 30th to 70th percentile, and "high" is above the 70th percentile.

Table 3. Use of Teacher Recruitment Incentives by District Characteristics

(percent of responses)[1]

Enrollment[2]	Low	Medium	High	All Districts
District offers recruiting incentives	***66.0***	***75.6***	***76.3***	72.8
One-time compensation for new teachers (signing bonus)	1.3	2.8	2.6	2.3
Additional compensation for extra-curricular or administrative functions	45.1	48.9	55.9	49.9
Flexibility in crediting teaching experience in other districts or states	41.8	49.4	50.7	47.4
Flexibility in crediting job experience in non-teaching occupations	19.0	15.0	18.4	17.3
Additional compensation for National Board Certification	***8.5***	***13.3***	***25.7***	15.7
Subsidized tuition in local college	15.7	16.1	17.8	16.5
Additional compensation for teaching in hard-to-staff fields	9.2	6.1	7.2	7.4
Additional compensation for teaching in hard-to-staff schools	0.7	0.6	0.0	0.4
Help with purchase of a home	0.7	1.1	0.7	0.8

SED Need/Resource Capacity Categories	High Need Urban	High Need Rural	Average Need	Low Need
District offers recruiting incentives	89.3	75.7	71.3	67.9
One-time compensation for new teachers (signing bonus)	***10.7***	***4.7***	***1.5***	***0.0***
Additional compensation for extra-curricular or administrative functions	64.3	52.3	49.1	41.7
Flexibility in crediting teaching experience in other districts or states	39.3	45.8	48.0	47.6
Flexibility in crediting job experience in non-teaching occupations	10.7	15.0	17.8	19.0
Additional compensation for National Board Certification	***28.6***	***9.3***	***16.4***	***16.7***
Subsidized tuition in local college	***21.4***	***14.0***	***19.3***	***8.3***
Additional compensation for teaching in hard-to-staff fields	***17.9***	***11.2***	***5.1***	***6.0***
Additional compensation for teaching in hard-to-staff schools	0.0	0.0	0.7	0.0
Help with purchase of a home	3.6	1.9	0.4	0.0

[1]Bold and italics indicates that there is a statistically significant difference between the categories (10% level).

[2]"Low" is below 30th percentile, "medium" is 30th to 70th percentile, and "high" is above the 70th percentile.

Table 4. Use of Strategies to Increase Supply of Teachers by District Characteristics
(percent of responses)[1]

Enrollment[2]	Low	Medium	High	All Districts
Use Strategy to Increase Supply	83.0	87.8	89.5	86.8
Recruit teachers certified through alternative routes	40.5	40.0	50.0	43.3
Recruit substitute teachers	***73.2***	***81.1***	***83.6***	79.4
Recruit retired teachers	27.5	27.2	30.3	28.2
Recruit former teachers who have left teaching	9.2	5.0	8.6	7.4
Provide assistance to paraprofessionals to become certified teachers	***24.2***	***24.4***	***35.5***	27.8
SED Need/Resource Capacity Categories	High Need Urban	High Need Rural	Average Need	Low Need
Use Strategy to Increase Supply	85.7	86.0	89.5	79.8
Recruit teachers certified through alternative routes	46.4	41.1	46.5	36.9
Recruit substitute teachers	***82.1***	***71.0***	***83.6***	***73.8***
Recruit retired teachers	28.6	27.1	28.7	26.2
Recruit former teachers who have left teaching	7.1	8.4	7.6	6.0
Provide assistance to paraprofessionals to become certified teachers	39.3	26.2	25.8	28.6

[1]Bold and italics indicates that there is a statistically significant difference between the categories (10% level).

[2]"Low" is below 30th percentile, "medium" is 30th to 70th percentile, and "high" is above the 70th percentile.

Table 5. Application Materials Required by District Characteristics
(percent of responses)[1]

Enrollment[2]	Low	Medium	High	All Districts
Application form	94.0	92.2	91.9	92.5
College Transcripts	94.7	88.2	90.5	90.8
Certification Exam Scores	***69.6***	***73.1***	***55.2***	66.5
Teaching Portfolio	32.6	28.0	28.9	29.7
Letters of Recommendation	93.2	89.7	86.2	89.6
Writing Sample	***54.9***	***56.6***	***75.4***	62.0
Proof of Certification	***99.3***	***93.9***	***98.0***	96.7
Letter of Interest	96.0	98.3	94.0	96.0
Resume	99.3	99.4	97.3	98.6
SED Need/Resource Capacity Categories	High Need Urban	High Need Rural	Average Need	Low Need
Application form	88.5	96.2	93.2	87.8
College Transcripts	***92.6***	***97.1***	***90.8***	***82.9***
Certification Exam Scores	***76.2***	***73.2***	***66.2***	***56.8***
Teaching Portfolio	31.8	25.8	32.1	26.7
Letters of Recommendation	***96.0***	***93.3***	***89.9***	***82.7***
Writing Sample	***69.6***	***47.4***	***60.3***	***82.5***
Proof of Certification	***100.0***	***100.0***	***96.2***	***93.9***
Letter of Interest	100.0	97.1	96.6	92.7
Resume	100.0	99.1	99.2	96.4

[1]Bold and italics indicates that there is a statistically significant difference between the categories (10% level).

Table 6. Importance of Screening Criteria in Deciding Whom to Interview
(percent of responses)[1]

Enrollment[2]	Low	Medium	High	All Districts
Experience	***70.4***	***83.8***	***74.8***	76.7
GPA	***46.4***	***58.0***	***66.2***	57.0
References/Recommendations	94.7	96.6	96.0	95.8
Major in subject to be taught	96.1	97.2	95.4	96.1
Certification in subject to be taught	99.3	99.4	100.0	99.6
Master's degree	41.7	41.8	39.7	41.3
Caliber of certificating institution	***44.2***	***51.7***	***61.3***	52.5
Quality of Teaching portfolio	32.0	31.4	39.0	33.8
Residence in school district	9.4	4.6	4.7	6.3
Certification exam scores	30.4	40.3	35.6	35.9
Pre-screening tests	2.8	1.8	5.1	3.1
SED Need/Resource Capacity Categories	High Need Urban	High Need Rural	Average Need	Low Need
Experience	***96.3***	***74.5***	***77.4***	***71.1***
GPA	61.5	55.7	53.6	67.5
References/Recommendations	100.0	97.1	95.8	92.8
Major in subject to be taught	92.6	94.3	97.4	96.4
Certification in subject to be taught	100.0	99.0	99.6	100.0
Master's degree	44.4	36.2	41.3	45.8
Caliber of certificating institution	***64.0***	***40.2***	***54.3***	***57.8***
Quality of Teaching portfolio	45.8	26.2	35.5	35.4
Residence in school district	***18.5***	***5.9***	***5.7***	***3.7***
Certification exam scores	46.2	34.6	36.0	32.9
Pre-screening tests	***15.4***	***3.1***	***2.8***	***0.0***

[1]Bold and italics indicates that there is a statistically significant difference between the categories (10% level).

[2]"Low" is below 30th percentile, "medium" is 30th to 70th percentile, and "high" is above the 70th percentile.

Table 7. Topics Covered in the Interview Process by District Characteristics
(percent of responses)[1]

Enrollment[2]	Low	Medium	High	All Districts
Average number of interviews	***2.14***	***2.42***	***2.52***	2.37
Average length of interviews	***43.2***	***43.0***	***34.4***	40.4
Teaching philosophy	***95.4***	***99.4***	***96.1***	97.1
Experience	98.0	100.0	98.0	98.8
Subject related knowledge	***95.4***	***99.4***	***98.0***	97.7
Curriculum	***94.8***	***99.4***	***98.0***	97.5
Discipline	99.3	98.9	97.4	98.6
Diversity	61.4	61.1	71.1	64.3
Learning styles	88.9	93.9	89.5	90.9
Willingness to serve on committees	***72.5***	***73.9***	***61.2***	69.5
Professional/career goals	***94.8***	***86.7***	***84.2***	88.5
Willingness to be involved in extra-curricular activities	***85.6***	***77.8***	***55.3***	73.2
Teaching sample lesson	***37.9***	***51.7***	***60.5***	50.1

SED Need/Resource Capacity Categories	High Need Urban	High Need Rural	Average Need	Low Need
Average number of interviews	***2.15***	***2.08***	***2.41***	***2.66***
Average length of interviews	***37.8***	***44.5***	***41.4***	***32.7***
Teaching philosophy	***88.9***	***99.1***	***97.0***	***97.6***
Experience	96.3	99.1	98.9	98.8
Subject related knowledge	100.0	97.2	97.8	97.6
Curriculum	***100.0***	***93.4***	***98.5***	***98.8***
Discipline	100.0	99.1	98.9	96.4
Diversity	74.1	59.4	64.2	67.9
Learning styles	92.6	92.5	90.7	89.3
Willingness to serve on committees	***81.5***	***72.6***	***71.6***	***54.8***
Professional/career goals	92.6	92.5	88.1	83.3
Willingness to be involved in extra-curricular activities	***63.0***	***86.8***	***73.5***	***58.3***
Teaching sample lesson	***55.6***	***35.8***	***51.1***	***63.1***

[1]Bold and italics indicates that there is a statistically significant difference between the categories (10% level). Percent of districts where this topic was covered in any of the interviews.

[2]"Low" is below 30th percentile, "medium" is 30th to 70th percentile, and "high" is above the 70th percentile.

Table 8. Importance of Criteria in Selection

(percent of responses with criteria rated as important or very important)[1]

Enrollment[2]	Low	Medium	High	All Districts
Experience	82.4	84.4	84.9	83.9
Grade point average	***49.0***	***59.4***	***64.5***	57.7
References/recommendations	95.4	97.8	97.4	96.9
Pre-screening tests	10.5	6.7	8.6	8.5
Contribution to workforce diversity	***34.6***	***40.6***	***65.1***	46.4
Performance in teaching sample lesson	***48.4***	***58.9***	***74.3***	60.4
Professional/career goals	66.0	60.0	55.3	60.4
Major in area of teaching	98.0	97.2	96.1	97.1
Certification in subject to be taught	99.3	98.9	100.0	99.4
Master's degree	45.8	43.9	44.1	44.5
Caliber of certificating institution	41.2	48.9	52.6	47.6
Quality of teaching portfolio	34.6	40.6	38.8	38.1
Residence in school district	13.1	8.9	9.9	10.5
Certification exam scores	38.6	43.3	38.2	40.2
Subject knowledge demonstrated in interview	***96.1***	***92.8***	***98.7***	95.7
Willingness to be involved in extra-curricular activities	***66.0***	***63.9***	***47.4***	59.4
SED Need/Resource Capacity Categories	High Need Urban	High Need Rural	Average Need	Low Need
Experience	***100.0***	***78.3***	***85.4***	***81.0***
Grade point average	63.0	51.9	56.7	66.7
References/recommendations	92.6	97.2	97.8	95.2
Pre-screening tests	11.1	8.5	8.6	7.1
Contribution to workforce diversity	***74.1***	***34.9***	***45.9***	***53.6***
Performance in teaching sample lesson	***59.3***	***41.5***	***60.1***	***85.7***
Professional/career goals	59.3	59.4	60.8	60.7
Major in area of teaching	100.0	99.1	96.6	95.2
Certification in subject to be taught	100.0	100.0	98.9	100.0
Master's degree	44.4	42.5	42.9	52.4
Caliber of certificating institution	***55.6***	***38.7***	***47.4***	***57.1***
Quality of teaching portfolio	44.4	31.1	41.4	34.5
Residence in school district	***29.6***	***12.3***	***9.0***	***7.1***
Certification exam scores	51.9	43.4	39.9	33.3
Subject knowledge demonstrated in interview	96.3	96.2	95.5	95.2
Willingness to be involved in extra-curricular activities	63.0	62.3	60.8	50.0

[1]Bold and italics indicates that there is a statistically significant difference between the categories (10% level).

[2]"Low" is below 30th percentile, "medium" is 30th to 70th percentile, and "high" is above the 70th percentile.

Table 9. Factor Analysis of Average Teacher Qualifications at the District Level[1]

Factor Analysis 1	Factor Loading	Scoring Coefficient
Percent very selective colleges	0.489	0.097
Percent of passing score (NYSTCE)	0.799	0.265
Test score (NTE)	0.643	0.149
Percent permanent certification	0.773	0.267
Percent temporary or no certification	-0.833	-0.381
Cronbach alpha	0.744	
Factor Analysis 2		
Percent very selective colleges	0.440	0.161
Percent of passing score (NYSTCE)	0.786	0.288
Test score (NTE)	0.598	0.220
Percent permanent certification	0.803	0.295
Percent temporary or no certification	-0.836	-0.307
Percent graduate degree	0.463	0.170
Cronbach alpha	0.729	

[1] Principal component factor analysis with factor loadings based on oblique rotation (promax).

Table 10. Average Teacher Qualifications by District Characteristics
(percent of responses)[1]

Enrollment[2]	Low	Medium	High	All Districts
Percent very selective colleges	***48.1***	***53.1***	***52.3***	50.4
Percent of passing score (NYSTCE)	***86.3***	***86.5***	***86.3***	86.3
Test score (NTE)	661.7	661.5	660.6	661.3
Percent permanent certification	***75.8***	***77.6***	***76.4***	76.6
Percent temporary or no certification	***3.9***	***2.0***	***1.5***	2.5
Percent graduate degree	***76.8***	***82.4***	***85.3***	80.9
Teacher qualification score 1	***0.085***	***0.363***	***0.315***	0.238
Teacher qualification score 2	***0.040***	***0.427***	***0.409***	0.259
SED Need/Resource Capacity Categories	High Need Urban	High Need Rural	Average Need	Low Need
Percent very selective colleges	***45.9***	***48.3***	***51.7***	***50.1***
Percent of passing score (NYSTCE)	***84.5***	***86.0***	***86.5***	***86.4***
Test score (NTE)	***659.6***	***663.0***	***661.1***	***660.4***
Percent permanent certification	***75.7***	***76.4***	***76.6***	***77.2***
Percent temporary or no certification	***3.0***	***3.7***	***2.2***	***2.0***
Percent graduate degree	***81.9***	***75.5***	***80.2***	***88.6***
Teacher qualification score 1	***-0.099***	***0.131***	***0.298***	***0.279***
Teacher qualification score 2	***-0.106***	***0.078***	***0.306***	***0.435***

[1]Bold and italics indicates that there is a statistically significant difference between the categories (5% level).

[2]"Low" is below 30th percentile, "medium" is 30th to 70th percentile, and "high" is above the 70th percentile.

Table 11. Regression Results for Teacher Qualification Score Regressed on Whether Districts Uses National Board Certification as Recruitment Incentive[1]

Variables	Teacher Qualification Score 1 Coefficient	t-statistic	Teacher Qualification Score 2 Coefficient	t-statistic
Intercept	0.52145	1.05	0.58918	1.23
National Board Certification	**0.93555**	**2.40**	**0.80971**	**2.16**
Enrollment	0.01747	0.53	0.03262	1.02
Enrolllment squared	-0.00320	-1.57	-0.00406	-2.07
Pupil density	0.01058	0.58	0.01836	1.06
Adjusted salary[2]	0.00000	-0.64	0.00000	-0.09
Per pupil income	0.00068	1.84	0.00078	2.17
Per pupil property values	0.00000	-1.06	0.00000	-1.44
Income growth (2000-2002)	0.00000	-0.29	0.00000	-0.62
Value growth (2002-2003)	0.00086	0.30	0.00091	0.33
Percent subsidized lunch	-0.00261	-0.88	-0.00525	-1.85
Percent female-headed households	-0.93797	-1.55	-0.60411	-1.04
Percent limited English proficiency	0.01112	0.75	0.01184	0.83
Percent non-white enrollment	-0.00890	-2.57	-0.00665	-2.00
Dowstate district	-0.32443	-2.30	-0.22615	-1.67
Rural district	-0.03633	-0.44	-0.03828	-0.48
Sample size	435		435	
Root MSE	0.602		0.580	

[1]Estimated with linear 2SLS with instruments including average use of this practice in other districts in the same enrollment size and need class, and other districts in the same economic development region.

[2]Average salaries of teachers with 1 to 5 years of experience and with average education divided by the geographic cost of education index developed by SED using average wages for similar occupations in labor market areas in New York.

Table 12. Regression Results for Teacher Qualification Score Regressed on Whether the District Uses the Recruitment Practice[1]

	Teacher Qualification Score 1		Teacher Qualification Score 2	
Enrollment[2]	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Internet Use to Recruit Teachers				
Posts job openings on school district website	0.4048	1.28	0.3187	1.02
Post job openings on online recruitment websites targeted to teachers	**-0.7933**	**-2.96**	**-0.4877**	**-2.05**
Posts job openings on general online recruitment websites	0.1406	0.43	-0.1935	-0.60
Searches for candidates on a recruitment website	**0.2995**	**1.65**	**0.3350**	**1.84**
Allows candidates to submit applications online	-0.4402	-1.46	-0.2539	-1.11
Use Strategy to Increase Supply				
Recruit teachers certified through alternative routes	-0.1173	-0.52	-0.1717	-0.76
Recruit substitute teachers	-0.0610	-0.42	-0.0512	-0.35
Recruit retired teachers	-0.0848	-0.33	-0.0862	-0.33
Provide assistance to paraprofessionals to become certified teachers	-0.9579	-0.81	-1.0908	-0.87
District offers recruiting incentives	**0.9522**	**2.25**	0.5609	1.52
One-time compensation for new teachers (signing bonus)	-0.2964	-0.19	-0.5207	-0.34
Additional compensation for extra-curricular or administrative functions	**0.7028**	**2.08**	**0.6079**	**1.85**
Flexibility in crediting teaching experience in other districts or states	0.7875	1.53	0.1341	0.32
Flexibility in crediting job experience in non-teaching occupations	0.8449	1.22	0.9236	1.29
Additional compensation for teaching in hard-to-staff fields	-0.2775	-0.45	0.1302	0.21
Additional compensation for National Board Certification	**0.9356**	**2.40**	**0.8097**	**2.16**
Subsidized tuition in local college	**0.9950**	**2.53**	0.5463	1.55

[1]Estimated with linear 2SLS with instruments including average use of this practice in other districts in the same enrollment/need class, non-white enrollment/need class, SED region, or economic development region.

Table 13. Regression Results for Teacher Qualificaton Score Regressed on Interviews and Factors Considered in Selection[1]

	Teacher Qualification Score 1		Teacher Qualification Score 2	
	Coefficient	t-statistic	Coefficient	t-statistic
Interviews				
Number of interviews	**0.130**	**1.91**	0.102	1.57
Total interview length	-0.005	-0.64	-0.007	-0.83
Use of teacher sample lesson	**3.041**	**2.16**	**2.852**	**1.96**
Selection Factors[2]				
Experience	0.496	1.47	0.485	1.44
Grade point average	-0.303	-0.58	-0.419	-0.77
References/recommendations	-0.648	-0.78	0.201	0.25
Pre-screening tests	0.754	1.24	0.550	0.93
Contribution to workforce diversity	0.517	1.42	0.396	1.13
Professional/career goals	**-0.873**	**-3.31**	**-0.806**	**-3.18**
Major in area of teaching	-7.196	-1.62	-5.360	-1.53
Master's degree	0.179	0.72	0.158	0.64
Caliber of certificating institution	0.171	0.86	0.164	0.83
Quality of teaching portfolio	**0.658**	**1.78**	**0.588**	**1.63**
Residence in school district	0.288	0.58	0.234	0.47
Certification exam scores	**0.494**	**1.65**	0.184	0.66
Subject knowledge demonstrated in interview	0.169	0.11	0.131	0.09
Willingness to be involved in extra-curricular activities	-0.085	-0.48	-0.119	-0.68

[1]Estimated with linear 2SLS with instruments including average use of this practice in other districts in the same enrollment/need
[2]Includes factors where the district staff indicated they are important or very important in selection of teachers.

[1] Ballou's (1996) analysis of data from the *Surveys of Recent College Graduates* (1976-1991) suggests that a stronger academic background does little for a candidate's job prospects in public schools.

[2] The full survey instrument and detailed survey results are available on the website: http://www-cpr.maxwell.syr.edu/faculty/duncombe/teaching-survey/teacher-hiring.htm

[3] The SED classification is based on the ratio of a poverty measure (share of free lunch students in K-6 grades) and a measure of fiscal capacity, called the combined wealth ratio (CWR). The combined wealth ratio is a simple average of a property value index and income index relative to the state average. The ratio is used to determine whether a district is classified as high need (high ratio), average need (average ratio), and low need (low ratio). In addition, high need districts are broken down into large cities, small cities and suburbs, and rural districts. We have combined the categories for the large cities and "other high need urban and suburban" districts to preserve confidentiality of the survey responses.

[4] Several superintendents identified more than five colleges. We identified all the colleges they identified as partner colleges.

[5] For school districts on the border with other states, we included any college in the other state that was within 100 miles of the district.

[6] There are 38 BOCES across the state that offer a range of services—from special education to records management services—to encourage districts to share resources and realize economies of scale. The state encourages the use of BOCES by providing state aid reimbursement for some services.

[7] The survey questions on interview content asked "what share of interviews do the following occur?" It included response categories for no interviews, some interviews, most interviews, and all interviews. If a topic was covered in most or all first interviews, or second interviews, or third interviews in a district, it was counted as a topic in the interview process.

[8] The survey question on selection criteria asked, "How important are each of the following criteria in the final selection of teaching candidate(s), who are offered the job?" It included response categories for not important, somewhat important, important, very important, or not considered.

[9] However, even these estimates require major assumptions about distribution of resources within a district and school. Even controlling for district and school fixed effects, differential patterns of resource distribution within a school may not be adequately controlled for. In addition, very few micro-student datasets can be linked to individual teachers.

[10] Under the previous testing system, teachers took NTE exams in Communication Skills, General Knowledge, and Professional Knowledge. The new testing system requires teachers to pass the NYSTCE Liberal Arts and Science Test (LAST), and either the Assessment of Teaching Skills Elementary (ATS-E) or Secondary (ATS-S). In addition, teachers are required to pass Content Specialty Tests (CST) in the particular subject they are teaching in for permanent certification. More on teacher certification exams in New York is available on the website, http://www.highered.nysed.gov/tcert/certificate/certexam.htm.

[11] New York State has a number of certification categories, and changed certification requirements changed in early 2004. Since most of the teachers in our analysis were hired under the old certification system, we will focus on these categories. The highest level of certification is permanent certification, which is valid for life, and requires provisional certification in the field being taught, 2 years of teaching experience, a masters degree, and passage of all NYSTCE exams including subject area tests in the areas to be taught. The entry-level certificate is the provisional certificate, and requires a bachelors degree, and passage of the basic NYSTCE (or NTE) exams. Certificates of qualification has been provided to candidates typically with certification in another state to provide them with 5 years to qualify for permanent certification. For this analysis, certificates of qualification are treated the

same as provisional certificates. New York also issues a number of other certificates, which fall under the broad categories of temporary certificates or transitional certificates. Typically, these certificates are issued for 1 to 3 years, while the prospective teacher is fulfilling requirements for provisional certification. More information on teacher certification in New York is available on the website, http://www.highered.nysed.gov/tcert/certificate/index.html.

[12] Given that the purpose of the analysis is to summarize the qualifications into one factor for further analysis, we used principal components factor analysis with oblique rotation. With only one factor, we wanted to use the rotation that represented the most accurate clustering of variables.

[13] When we use the SED geographic cost of living index alone in the regression model most of the results did not change significantly.

[14] Both school size and class size could affect a teacher's view of working conditions. We did not include these variables since they could be endogenous to district budgeting decisions. If these variables are included in the model, the results did not change significantly.

[15] The appropriateness of use of adoption rates for similar districts as instruments can be challenged, because of a potential contagion effect where adoption of practices by districts in the same geographic area may influence other districts. To hopefully reduce this possibility, we included tested several sets of instruments that are less geographically based: districts that are in the same resource/capacity category, and in the same enrollment size (or non-white enrollment share) class. Unfortunately, we had to include geographic based instruments in some cases, because they were only the only instruments strongly related to the practice in first stage models.

[16] The regression coefficient should be interpreted with caution since the dependent variable is a composite measure of the underlying teacher qualifications. Roughly the coefficient on the NBC variable can be interpreted as indicating that that use of compensation for NBC is associated with a 1 standard deviation increase in teacher qualifications.

[17] The Putnam-Westchester BOCES has partnered with several other BOCES to operated in an online application system (OLAS), used by over 150 school districts in New York. For more information see: http://www.olasjobs.org/#candidate

[18] A sample lesson would typically involve preparation, and presentation of a lesson before a group of students and the interview team. Candidates would be asked to prepare the lesson in advance, and might submit the lesson plan to the committee. However, it is possible that the sample lesson would only be presented to the committee. We did not define in detail for superintendents what a sample lesson consisted of and the intended audience, so it is possible that superintendents interpreted this term differently.