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What Kind of Teachers Are Schools Looking For? Evidence from a Randomized Field Experiment

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Teacher quality is a pressing public policy concern, yet there is little evidence on what types of teachers schools actually prefer to hire. This paper reports the results of an experiment that involved sending schools fictitious resumes with randomly-chosen characteristics in an attempt to determine what characteristics schools value when hiring new teachers. The results of the study suggest that an applicant's academic background has little impact on the likelihood of success at private and charter schools, although public schools respond more favorably to candidates from more selective colleges. Additionally, private schools demonstrate a slight preference for female candidates, and all three sectors demonstrate a preference for in-state candidates.

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I. Introduction

A growing body of empirical work documents the large heterogeneity in quality amongst classroom teachers.[1] This quality matters. Recent work by Chetty, Friedman, and Rockoff (2014a) finds that teacher quality in the early grades affects students' earnings in adulthood. And Hanushek (2011) writes, "Replacing the bottom 5-8 percent of teachers with average teachers could move the U.S. near the top of international math and science rankings with a present value of $100 trillion." It follows from this line of work that the distribution of teacher quality has the potential to dramatically affect the level and distribution of national income.

There are major policy efforts to raise teacher quality. Federal financial aid policy seeks to shape the teaching workforce by offering TEACH grants and federal student loan forgiveness to teachers in high-poverty schools or teachers of high-need subjects, programs like Teach For America have the goal of drawing academically-talented recent college graduates into the teaching profession, and merit pay policies that are in place in some school districts aim to attract individuals who would be effective teachers. However, these policies and programs generally focus on the supply side of teacher labor markets. Less attention has been paid to the demand side. But clearly, the policies and actions of the districts, schools, and administrators on the hiring side of teacher labor markets affect who becomes a teacher as well. If these actors are hiring teachers suboptimally, there may be a potential to raise teacher quality by simply making changes to the hiring process. But despite this potential, little is known about how effective schools are in screening applicants or about what characteristics they seek in potential teachers.[2]

[1] Seminal work includes Aaronson, Barrow, and Sander (2007); Hanushek (1971); Murnane (1975); Rivkin, Hanushek, and Kain (2005); and Rockoff (2004). But also see Rothstein (2009, 2010) for an influential critique of conventional estimators of teacher value-added. Also see Chetty, Friedman, and Rockoff (2014b).

[2] There are some previous studies, such as Harris et al. (2010), which survey principals about what kinds of teachers they are looking for, although the sample sizes are typically small. Moreover, it is not clear that actual hiring behavior is consistent with responses to surveys.

This paper sheds some light on the demand for teacher characteristics through a randomized controlled experiment in the labor market for new teachers. The experiment randomly manipulates characteristics on resumes submitted by fictitious candidates for teaching positions and then studies how the responses to different characteristics vary. In particular, I sent 6,000 fictitious resumes to randomly-selected schools across the United States, along with cover letters expressing an interest in being hired for a teaching position. The resumes attempt to experimentally induce the demand side's perceptions of a candidate's academic background, sex, geographic location, and other characteristics. Due to the random assignment of these resume characteristics, comparing responses to the various resumes should provide a credible estimate of what characteristics schools value in the initial screening stage when hiring new teachers. The results of the study suggest that an applicant's academic background has little impact on the likelihood of success at private and charter schools, although public schools respond more favorably to candidates from more selective colleges. Additionally, private schools demonstrate a slight preference for female candidates, and all three sectors demonstrate a preference for in-state candidates.

The rest of this paper is organized as follows: Section II provides relevant background information, Section III discusses the methodology used in this experiment on teacher labor markets, Section IV gives the results, and Section V concludes.

II. Background Information

A. Previous Research on Teacher Hiring

Earlier research on teacher labor markets includes work on teacher labor supply (Bacolod 2007; Corcoran, Evans, and Schwab 2004a, 2004b; Engel, Jacob, and Curran 2014; Ransom and

Sims 2008), the sorting of teachers across schools (Boyd et al. 2005a; Clotfelter, Ladd, and Vigdor 2005, 2006; Goldhaber, Gross, and Player 2011; Jackson 2009; Lankford, Loeb, and Wyckoff 2002), and the impact of counterfactual personnel policies on teacher quality (Rothstein forthcoming; Staiger and Rockoff 2010). There is less work on how effective schools are in screening teachers. However, Kane and Staiger (2005) find that teachers hired as part of a hiring surge by Los Angeles Unified School District to comply with a California class size reduction policy did not perform significantly differently from teachers hired the previous year as part of a much smaller cohort. This provides indirect evidence that the district was not effective in screening teachers because, if it were, one would expect the marginal teacher to be worse than the average teacher and for average teacher quality to fall as more teachers are hired.[3]

More directly related to the present study is Ballou (1996), an influential paper that addresses the question of how interested schools actually are in hiring academically-talented teachers. Ballou (1996) uses data from several waves of the Survey of Recent College Graduates and finds that, of those individuals who applied for any teaching position, those who had more impressive academic qualifications in terms of college selectivity or having majored in math or science were not more likely to be later found working as a teacher than those with less impressive academic qualifications. Ballou (1996) interprets this result as showing that the demand side does not show much interest in hiring teachers who are academically strong. Although Ballou (1996) provides additional information that supports this interpretation of the results, it is difficult to completely rule out the possibility that the results are driven by applicants who are more academically talented having better outside options than those who are less academically talented. They may thus have lower search intensities or be less likely to accept a

[3] Also see Jepsen and Rivkin (2009), a statewide study of California's class reduction policy that finds "little systematic relationship between cohort size and teacher quality."

position once offered, which could explain why talented applicants who applied for at least one teaching position do not end up working as teachers without implying anything about the preferences of schools over applicants for any particular teaching position. Furthermore, there is a question of whether the results in Ballou (1996) would still hold true today after the spread of test-based accountability, the growth of charter schools, and other changes to the educational landscape.

Boyd et al. (2011) attempt to circumvent some of the difficulties of Ballou (1996) by employing data on teachers' applications to transfer to specific schools in New York City. These authors find that, of those teachers who applied for a transfer, those who had higher certification exam scores, who had a higher value-added, and who attended more selective colleges were more likely to be working in the new position the following year. Boyd et al. (2013) obtain similar results when using data on the matching of teachers to jobs in New York State to estimate a structural, game-theoretic, two-sided matching model of the teacher labor market. The general results in Boyd et al. (2011) and Boyd et al. (2013) are thus in contrast to Ballou (1996). The present paper thus seeks to cleanly identify preferences of schools over candidates at the initial screening stage by randomly assigning academic qualifications to resumes, sending them to specific schools, and then monitoring the responses received from these particular schools.

There is also a small body of research on the narrow geographic scope of teacher labor markets. A survey of Pennsylvania school superintendents found that, in the average district, 40% of the teachers had previously attended high school within the district (Strauss et al. 2000). Boyd et al. (2013) note that, "In New York State, over 60% of teachers first teach within 15 miles of the high school from which they graduated and 85% teach within 40 miles." And, Reininger (2012) finds, "Across the country, the median distance moved by teachers [relative to

where they lived in 10th grade], 13 miles, is much less than that of other college graduates, 54 miles, and is more similar to the median distance used by high school graduates, 7 miles."

These statistics on geographic mobility may suggest that schools are casting a narrow net when searching for teachers. If this is true, it may be problematic because a broader search may result in better candidates. However, an alternative explanation for these statistics is that the candidates themselves may be particularly interested in working near where they grew up. The results of the matching model in Boyd et al. (2013) suggest that teachers do have a preference to work at nearby schools but also that schools do in fact also have a preference to hire teachers who live near the school at the time they applied for certification. Killeen, Loeb, and Williams (2013) obtain similar results when studying job application data for teachers in Vermont.[4] The present study builds on this earlier work by randomly varying the stated geographic location of job seekers in an attempt to cleanly identify the extent to which the demand side is responsible for the narrow geographic scope of teacher labor markets.

Although little is known about gender discrimination in teacher hiring, research suggests that labor market discrimination against women exists in other contexts (Altonji and Blank 1999; Goldin and Rouse 2000). But one interesting feature of the teaching profession is that it is one in which women are overrepresented. According to tabulations from the Current Population Survey, only 18.6% of elementary and middle school teachers are men. Men are even underrepresented as high school mathematics teachers, as tabulations from the Schools and Staffing Survey reveal that only 43.2% of mathematics teachers in grades 9-12 at public schools

[4] Also see Boyd et al. (2005a) on the relationship between geographic proximity and teacher turnover.

are men.[5] A goal of this study is to determine whether schools themselves have a role in exacerbating or reversing these disparities.

B. The Relationship between Teacher Characteristics and Teacher Quality

An effective teacher hiring process would distinguish among candidates along dimensions that are related to productivity but would not discriminate based on irrelevant characteristics. This raises the question of whether the characteristics I consider in this study actually are related to teacher quality. For example, one might contend that it is unproblematic that schools treat applicants of high academic ability and low academic ability equally if academic ability is unrelated to success as a teacher.

Although there is not a universal consensus on the topic, there is a strong case to be made that academically-talented teachers are in fact better in the classroom. Hoxby and Leigh (2004) state that it is a matter of "logic" that "a teacher's value-added is related to her academic aptitude." Ballou and Podgursky (1997) argue that, "The link between teachers' cognitive abilities and student learning stands out in a literature that frequently fails to find significant relationships between other teacher attributes and student achievement."[6] A review article by Goldhaber (2008) notes that, although teacher quality is not generally associated with easily-observed characteristics of teachers, "Some readily identifiable characteristics do predict success in the classroom. In particular, measures of academic proficiency or cognitive ability, such as a teacher's performance on standardized tests (e.g., licensure tests or the SAT or the selectivity of

[5] The elementary and middle school figure is for 2012 and was found at http://www.bls.gov/cps/cpsaat11.pdf (accessed February 24, 2013). The high school mathematics figure is for 2007-08 and can be found in Table 75 of the 2012 *Digest of Education Statistics*.

[6] Another exception to the general result that observable teacher characteristics are not associated with achievement is that research generally finds that teachers improve over their first couple years on the job (see, e.g., Goldhaber 2008). However, experience is not a characteristic that I vary in this study because it may be easier for school officials to determine that a resume from an experienced applicant is fictitious. Thus, all the resumes in this study are for new teachers.

the colleges she graduated from), and subject specific training (e.g., a degree in mathematics) in a teacher's specialty area appear to be predictors of teacher quality." Similar results have been found in a more recent wave of studies, including Clotfelter, Ladd, and Vigdor (2010); Goldhaber (2007); and Jackson and Bruegmann (2009).[7] This perceived relationship between between teacher aptitude and student success has also apparently motivated organizations such as Teach For America, which has the stated mission of "eliminat[ing] educational inequality by enlisting high-achieving recent college graduates and professionals to teach for two or more years in high potential communities throughout the United States."

Additional evidence in favor of the proposition that academically-talented teachers are better teachers comes from recent studies of Teach For America. One study based on random assignment of students to teachers finds that Teach For America teachers have a positive effect on math test scores, albeit not on reading test scores (Glazerman, Mayer, and Decker 2006). An observational study by Xu, Hannaway, and Taylor (2011) also finds a positive effect of Teach For America teachers on test scores. Also of note is Dobbie (2011), who finds that, amongst Teach For America teachers, those who are rated as having high academic achievement have a positive effect on student math test scores.

Researchers have also studied the effects of teacher gender. Work by Dee (2005, 2007) suggests that there are academic benefits when students are matched with a teacher of the same gender as themselves. Dee (2007) finds that, excluding mathematics, the test score gain to girls from having a female teacher is roughly equal to the test score loss to boys from having a female teacher. Thus, if the students in a classroom are balanced on gender, we would not expect

[7] However, one recent example to the contrary is Harris and Sass (2011), which finds that teachers' SAT scores are not associated with teacher value-added.

teacher gender to have an effect on average achievement in these subjects even though it might affect the distribution of achievement.[8]

However, the results about gender match between students and teachers are noteworthy given that males now lag behind females on a variety of academic outcomes, including college attendance rates (Jacob 2002; Goldin, Katz, and Kuziemko 2006). Having a higher percentage of male teachers may reduce these gender gaps. Some commentators, such as Gormley (2012), have thus called for a larger number of male teachers. Although one may argue that male underperformance in school may not be cause for concern because men still outperform women in the labor market, it is also worth keeping in mind that men also fare worse than women on a number of "left tail" outcomes and that education may mitigate this problem. For example, Lochner and Moretti (2004) and Deming (2011) both note that men commit much more crime than women and also find that schooling has the potential to reduce crime.

Finally, the relationship between teacher geographic proximity and student achievement is unclear.[9] However, insofar as a preference for nearby applicants is indicative of schools casting a narrow net for potential teachers, this would be expected to result in worse hiring decisions. Furthermore, as with the other variables considered in this study, it is still of interest to know which characteristics schools actually do consider in hiring even if there is not universal consensus on which characteristics they ought to consider. This can further our understanding of how teacher labor markets operate and add to our knowledge about the composition of the teaching workforce.

[8] However, Dee (2007) also finds that having a female teacher has a negative relationship with math test scores for both boys and girls, although he suggests that this result may be due to nonrandom sorting of teachers to classrooms. But Antecol, Eren, and Ozbeklik (forthcoming) find, based on random assignment of students to teachers, that having a female teacher actually is associated with lower math test scores for female students. To the extent that this is true, having more male teachers may raise achievement across the board.

[9] Although some may argue that candidates from nearby will better understand the unique local context, it is not clear how important this is. Furthermore, one could just as easily make the case that students will benefit from being exposed to teachers who are different from themselves.

C. Resume Audit Studies

The practice of studying the responses to fictitious job applications in order to measure employer preferences is known as a "resume audit study" or a "correspondence study." This methodology was employed as early as 1970 to test for discrimination against immigrants in England (Jowell and Prescott-Clarke 1970). The methodology has recently enjoyed increased popularity in economics, owing in large part to Bertrand and Mullainathan's (2004) study of whether employers discriminate against job applicants with distinctively black names. Resume audit studies have also been used to study discrimination based on age (Lahey 2008), gender (Riach and Rich 2006), sexual orientation (Weichselbaumer 2003), immigrant status (Oreopoulos 2011), and obesity (Rooth 2009). Recent resume audit studies have gone beyond studying whether employers discriminate based on demographic and physical characteristics to study such topics as the extent to which employers value mathematics skills (Koedel and Tyhurst 2012) and degrees from for-profit colleges (Darolia et al. 2014 and Deming et al. 2014), as well as how employers weigh unemployment spells of various durations (Eriksson and Rooth 2014; Kroft, Lange, and Notowidigo 2013).

A strength of resume audit studies is that they provide the researcher control over all information employers can observe about a candidate. This allows the researcher to randomly assign resume characteristics and isolate the effects of these characteristics on employer responses. This overcomes some of Heckman and Siegelman's (1993) criticisms of in-person audit studies, such as the possibility that the testers will differ from one another along important

unobservable dimensions and the possibility that the testers will act in a way that leads to the results they believe the experimenter wants to find.[10]

However, a limitation of the typical resume audit study is that the researcher can observe only whether or not a candidate is called in for an interview, which may not provide a complete picture of the hiring process. Nonetheless, Riach and Rich (2006) point out, based on studies that send out fictitious resumes and then follow up with interviews of trained actors posing as job seekers, that most discrimination takes place at the initial resume screening stage of the hiring process. Thus, studying this initial screening stage seems to provide an effective means of gauging employer preferences. Intuitively, if hiring personnel have preferences over easily-observed characteristics such as gender, age, or academic credentials, it would seem that they would be able to exercise those preferences early on in the hiring process. Furthermore, although who is hired is likely of more interest than who is interviewed, there is a relationship between the two in that the pool of interviewees is also presumably the pool of potential hires. Even if hires are made randomly from the pool of interviewees, factors that affect the probability of receiving an interview would also affect the unconditional probability of being hired.

III. Methods

A. Selecting the Sample

The first step of this resume audit study was to select the schools involved. I selected 3,000 schools to receive two resumes each. Thus, the overall sample of 6,000 is similar to that in earlier resume audit studies, such as Bertrand and Mullainathan (2004) and Lahey (2008).[11] The

[10] Some prominent examples of in-person audit studies are Neumark, Bank, and Van Nort (1996); Ondrich, Ross, and Yinger (2003); and Yinger (1986).

[11] This sample size is also supported by power calculations and a small pilot study I conducted. Details are available upon request.

schools were selected at random from the 2009-10 Common Core of Data, which includes data on charter schools in addition to traditional public schools, and the 2009-10 Private School Survey. These data sets are intended to form a complete census of schools in the United States, and the 2009-10 data were the most recent data available at the time of the study. In order to explore heterogeneity across school sectors, the sample consists of 1,000 traditional public schools, 1,000 charter schools, and 1,000 private schools. Within each of these sectors, schools were sampled without replacement with a probability proportional to student enrollment.[12]

B. Creating the Resumes

The next step of the study was to create the fictitious resumes. The goal was to create realistic-looking resumes for recent college graduates seeking their first teaching position. To aid in this process I consulted guidebooks for prospective teachers, as well as some actual resumes of current and former teachers.[13] I then created one-page resume templates that were similar in style to the actual resumes I consulted. The resume templates contain fields to fill in a candidate's name and contact information, information on the candidate's educational background and licensure status, a list of personal strengths, and information on student teaching and other previous work experience. I use a variety of values for each of these variables, which may help overcome Heckman and Siegelman's (1993) critique of previous audit studies that estimate discrimination at only a single value of the background characteristics.

[12] In a small number of cases in which multiple schools in the sample had the same principal or administrator, one of the schools was selected at random to remain in the study and the rest were replaced by a new school selected at random from the relevant population.

[13] These guidebooks include Anthony and Roe (2003); Brause, Donohue, and Ryan (2002); Clement (2007); Enelow and Kursmark (2011); Feirsen and Weitzman (2004); Hougan (2011); McKinney (2000); Pollock (2011); Warner, Bryan, and Warner (2006); and Wei (2010).

Characteristics of the fictitious job applicants were generally filled in to the resume templates at random and independently from one another, but an exception is the information on college major and teacher licensure. Based on conversations with officials at state licensure agencies in a number of states, all resumes sent to elementary schools listed a major and certification in elementary education. All resumes sent to secondary schools list a major and certification in mathematics, and with probability .25 the secondary school resumes list an additional certification in science. These fields were chosen in an attempt to maximize power for a given sample size, on the belief that job applicants in math and science would be more likely to receive a positive response relative to those in other disciplines.

The main academic credentials I consider in this study are grade point average (GPA) and college attended. Resumes were assigned a grade point average of 3.1, 3.5, and 3.9 with probability 1/3 each. The procedure for choosing the colleges is slightly more complicated. I began by randomly assigning each resume to list either a college in the same state as the school the resume was to be sent to (with probability .75) or a college in a different state (with probability .25).[14] I then selected all colleges in the 2011 edition of *Barron's Profiles of American Colleges* that offered majors in both elementary education and mathematics. Barron's assigns colleges to nine quality tiers, and not every state has a college in each quality tier. The in-state resumes were given a college in the highest selectivity tier of colleges in the state, a college in the lowest selectivity tier of colleges in the state, and a college in one of the middle selectivity tiers each with probability 1/3.[15] The out-of-state resumes were assigned a college in

[14] Importantly, schools receiving out-of-state resumes is not a rarity. For example, Killeen, Loeb, and Williams (2013) find that about 45% of applicants for teaching positions in Vermont are from outside the state. Although this figure is likely higher for Vermont than other states due to its small size, the point is that it is possible for teachers to cross state lines.

[15] For example, in Florida there are 23 institutions that meet the requirement of offering both a mathematics major and an elementary education major. The highest rated of these was The University of Miami, which falls in the "most competitive" category. Thus, all the resumes from the Florida in-state sample that were selected to have the

a similar manner, except that the three selectivity categories were based on colleges nationwide rather than just those in a particular state.

The names of the fictitious applicants were selected at random from names that were popular at the time the applicants likely would have been born. I utilized the five most common last names in the 1990 census (Brown, Johnson, Jones, Smith, and Williams), the ten most common first names for girls born in 1990 (Amanda, Ashley, Brittany, Elizabeth, Jennifer, Jessica, Lauren, Samantha, Sarah, and Stephanie), and the ten most common first names for boys born in 1990 (Andrew, Christopher, Daniel, David, James, Joseph, Joshua, Justin, Matthew, and Michael).[16] The study uses all 100 combinations of first and last names amongst these popular names. With the assistance of a direct mail marketing company, the resumes were randomly assigned actual apartment addresses in or near the city that the college listed on the resume is located in. Although I was not able to monitor any responses received by U.S. mail, one previous audit study that was able to do so found that very few employers responded by U.S. mail; moreover, when they did respond, it was never to request an interview (Lahey 2008). Each resume also lists student teaching experience at a school selected at random from the Common Core of Data that is in or near the city in which the applicant's college is located. The resumes were also randomly assigned additional previous work experience, as well as a list of personal strengths. Finally, the resumes were given functioning e-mail addresses and phone numbers in order to monitor the responses.

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highest selectivity level list The University of Miami as the college attended. The Florida in-state resumes that were selected to have the lowest selectivity level list one or another of the three institutions in Florida that offer both a mathematics major and elementary education major and are rated by Barron's as being "less competitive." The middle selectivity resumes from Florida list one or another of the 19 remaining universities in Florida that offer both a mathematics major and an elementary education major. Each college that matches the state and selectivity tier the college is to be selected from was equally likely to be chosen.

[16] The first names come from http://www.ssa.gov/cgi-bin/popularnames.cgi, and the last names come from http://www.census.gov/genealogy/www/data/1990surnames/names_files.html.

C. Sending the Resumes

One way in which this study differs from previous resume audit studies is that this study sends unsolicited e-mails to school administrators rather than applying to posted job openings. Although this was done for practical reasons, it is worth noting that Heckman and Siegelman (1993) criticize the practices of previous resume audit studies on the grounds that many job openings are not actually posted. Applying for only posted positions may therefore potentially result in misleading measures of employers' preferences over candidates. Additionally, according to guidebooks for prospective teachers, sending unsolicited resumes is a recommended method of searching for a teaching position (Brause, Donohue, and Ryan 2002; McKinney 2000; Wei 2010).[17] Moreover, the reasonably high response rate the unsolicited resumes received from schools in this study validates this method of job search.

Each school in this study received two resumes, generally one in June 2012 and one in August 2012. The purpose of the two-month lag between resumes is to lessen any suspicion of the two resumes having the same origin. Furthermore, each school received a resume in the second round that used a different format and style than the one it had received in the first round. All resumes were accompanied by a brief cover letter expressing an interest in being interviewed for a teaching position. The resumes were generally sent by e-mail to the principal, headmaster, or other lead administrator of the school.[18] I obtained e-mail addresses of school administrators by searching through state directories, looking at school websites, and calling schools and directly asking for the principal's e-mail address without providing any information about the

[17] The formal hiring process and the amount of discretion the principal has vary across school districts, although Rutledge et al. (2008) explain that principals can find ways to circumvent the formal process even in cases in which the rules make it difficult for them to hire their preferred candidates.

[18] Due to an apparent glitch with an e-mail add-in, for a small number of e-mails there is no record in the "sent items" folder of the e-mail actually having been sent. In these cases, I resent the e-mail. The main results are robust to alternative treatments of these cases, including controlling for these cases with a dummy variable or dropping them from the sample. Additionally, due to human error, a small number of e-mails were sent from a different e-mail address than originally intended. The results are also robust to alternative treatments of these cases.

purpose of the study. Resumes were sent by US mail to schools for which I was unable to obtain the head administrator's e-mail address using one of these three methods.

Finally, a word about the timing is in order. According to the guidebooks for prospective teachers I consulted, the market for new teachers occurs over an extended period of time but many hiring decisions are not made until just before the school year begins. One guidebook states, "May and June are the busiest months for hiring teachers….Hiring activity slows in July….Hiring picks back up in August and September as principals try to fill remaining vacancies, as well as last minute teacher transfers and retirements" (Hougan 2011, p. 140).[19] The four large urban districts studied in a report by the New Teacher Project all still had vacancies after the school year had begun (Levin and Quinn 2003). Moreover, Engel's (2012) tabulations of data from the Schools and Staffing Survey suggest that 25% of new teachers are hired before the previous school year ends, 30% are hired during the first half of the summer, 34% are hired during the second half of the summer, and 11% are hired after the school year has already begun. In an attempt to send resumes at around the time schools would be hiring, I opted to send the resumes in June and August. The resumes sent in August had roughly the same response rate as those sent in June.

D. Coding the Responses

I monitored the e-mail addresses and voicemails for responses through the end of 2013. I then coded variables based on the type of response received. The main outcome variables employed in this study are a dummy for whether a resume received an interview request and a dummy for whether a resume received either an interview request, a request for more

[19] Also see Feirsen and Weitzman (2004). Moreover, a survey of New York State school superintendents conducted by Balter and Duncombe (2008) finds that the average school district typically makes job offers in June. See Papay et al. (2013) on the consequences of late hiring.

information, or a request to apply for or interview for a different position (e.g., a substitute teaching position.) I thus follow earlier authors, such as Lahey (2008), by considering both a broader and a narrower measure of success.

E. Models and Estimators

Due to the random assignment of the resume characteristics, the analysis of the data is relatively simple and straightforward. However, one complication is that the even mix of public schools, charter schools, and private schools in the sample implies that charter schools and private schools are overrepresented in the sample relative to their share of student enrollment. I reweight the summary statistics and regressions by sectoral enrollment in order to produce results that are representative of the school the average student is attending.[20]

The full regression specification is

$$positive_{ijs} = \beta_1 \cdot highGPA_{ijs} + \beta_2 \cdot mediumGPA_{ijs} + \beta_3 \cdot highselectivity_{ijs} + \beta_4 \cdot mediumselectivity_{ijs} + \beta_5 \cdot female_{ijs} + \beta_6 \cdot outofstate_{ijs} + x_{ijs}'\beta_7 + \delta_s + \varepsilon_{ijs}.$$

The unit of observation is a resume, with resume *i* being sent to school j in state s. Here $positive_{ijs}$ is an indicator for receiving a positive response to a resume, $highGPA_{ijs}$ is an indicator for the resume listing a GPA of 3.9, $mediumGPA_{ijs}$ is an indicator for the resume listing a GPA of 3.5, $highselectivity_{ijs}$ is an indicator for the resume belonging to the high selectivity tier, $mediumselectivity_{ijs}$ is an indicator for the resume belonging to the medium selectivity tier, $female_{ijs}$ is an indicator for the resume listing a female name, and $outofstate_{ijs}$ is a dummy for the resume listing an address and college from outside the state the receiving school is in.

[20] As mentioned earlier, within each of the three sectors schools were sampled with a probability proportional to student enrollment. Thus, reweighting by the size of the sectors produces results that are representative of student enrollment even across sectors.

Control variables for whether the resume lists an additional certification in science, the level of the school, the sector of the school, the racial composition of the school, and the urbanicity of the school are included in the vector x_{ijs}. The term δ_s denotes a full set of state indicators for the receiving school, which subsume an additive constant. The error term is ε_{ijs}, and the β's are parameters to be estimated. I report standard errors that are clustered at the school level. I also estimate some models that enter the various treatments in isolation and do not control for covariates. However, this does not have much impact on the point estimates, which is unsurprising given that the resume characteristics are assigned randomly.[21] The effects on the standard errors are minimal as well. Finally, I also explore heterogeneity by school sector and between elementary and secondary schools.

IV. Results

Table 1 displays summary statistics. All variables except for the "Fraction Underrepresented Minority" variable are binary, so only means are shown in the main body of the table. The "unweighted mean" column of Table 1 shows simple averages that give each of the 6,000 observations in the study equal weight. The results in this column indicate that roughly 4.5% of resumes sent received an interview request. But when defining "positive outcome" more broadly to include cases in which the school asked for additional information about the candidate or asked the candidate to apply or interview for a different position, the rate of positive response is roughly 8.0%. These figures are lower than the corresponding figures in previous resume audit studies, which is not altogether surprising given that the resumes in this experiment were not sent in response to posted positions. What is perhaps more surprising is that these

[21] Although the results shown in this paper are from linear probability models, the results are very similar when estimating probits and logits.

figures are not too much lower than the corresponding figures in other studies. For example, Lahey (2008) and Kroft, Lange, and Notowidigdo (2013) both obtain interview request rates of about 4.7%, and under Lahey's broader definition of "positive response" the success rate is about 9.0%.

However, the positive response rate in this study falls to roughly 5.2% and the interview request rate falls to roughly 3.2% in the "weighted mean" column, which reweights the three sectors by relative enrollment to produce results that are representative of the school the average student attends.[22] This drop is attributable to public schools being less likely to give a positive response or an interview request in response to receiving a resume than charter schools and private schools are. The remaining rows of Table 1 show characteristics of the schools that received the resumes and also demonstrate that the actual assignments of the treatment variables are similar to the intended probabilities. It is clear from examining the "weighted mean" column that the share of students attending traditional public schools (88.9%) is much higher than the share of students attending either private schools (8.1%) or charter schools (3.0%). Furthermore, a comparison across the two columns suggests that public school students are disproportionately located in rural areas.

The reasonably high positive response rate and interview request rate shown in Table 1 suggest that the method of sending unsolicited resumes employed by this study can potentially be an effective method of job search for teachers. Furthermore, although this method of search may not be effective at every single school, whether it might be effective at a particular school is independent of the characteristics on the resumes sent to the school due to the randomization of

[22] In order to have enough power to make comparisons across sectors, the sample in this study consists of equal numbers of resumes sent to public schools, charter schools, and private schools. This means that charter schools and private schools are overrepresented in the sample relative to their representation in the population of schools in the United States. The reweighted results give a large weight to public schools as a result of the relative size of the public sector in the United States.

the characteristics on the resumes. But even if this is not a source of bias, there may be a concern about generalizability. However, the results in Table 2 should assuage this concern. This table shows the unweighted positive response rate and interview request rate broken down by school characteristics. The results show a non-trivial success rate for resumes sent to schools in more urban areas and less urban areas, to larger schools and smaller schools, and to schools located in larger districts and schools located in smaller districts. To be sure, this table considers only a limited set of characteristics, and the results cannot rule out the possibility that there are important unobservable characteristics of schools that are correlated with whether sending an unsolicited resume to the school has the potential to lead to a job interview. However, the results in Table 2 do at least provide evidence against some simple hypotheses that this method of search will not effective at particular types of schools.[23]

The main results are first presented in Table 3. This table shows the (weighted) rate at which resumes listing the various characteristics received a positive response, as well as weighted regression results. The regressions in columns 2-5 show results for the various sets of treatments in isolation and without controlling for any covariates. The point estimates in these columns can be gleaned from column 1, although columns 2-5 add asterisks for statistical significance relative to the excluded category. Column 6 shows results from a regression that includes all the various treatments simultaneously and also controls for additional covariates. As is to be expected from the randomization of the characteristics on the resumes, the results in column 6 are very similar to the results in columns 2-5.

The results in Table 3 suggest that having a high GPA does not help candidates. In fact, roughly 5.0% of resumes listing a GPA of 3.9 received a positive response, compared to 5.1% of

[23] For example, the results do not support the hypothesis that this method of search will not be effective at urban schools due to urban schools having a different application process than non-urban schools.

those listing a GPA of 3.5 and 5.5% of those listing a GPA of 3.1 Thus, the point estimates for the GPA variables in columns 2 and 6 are negative, albeit not significantly different from zero at conventional levels. The fact that having a low GPA is not an impediment to receiving a positive response is particularly noteworthy given the level of grade inflation in education schools documented by Koedel (2011). A GPA of 3.1 is potentially very low in the distribution, so it is interesting that these resumes are treated similarly to those listing a GPA of 3.5 or 3.9. Moreover, although the general results of Ballou (1996) suggest that strong academic qualifications do not help in obtaining a teaching position, Ballou (1996) actually finds a positive effect of undergraduate grade point average.

Although having a higher GPA does not seem to help candidates, the resumes in the study listing a more selective college were more likely to receive a positive response than those listing a less selective college. The high selectivity colleges in the sample had a positive response rate of roughly 6.9%, compared to 5.1% for the medium selectivity colleges and 3.7% for the low selectivity colleges. The results in columns 3 show that the difference of 3.2 percentage points between high and low selectivity colleges is significant at the 1% level, and column 6 shows that the difference between medium and low selectivity colleges becomes significant at the 5% level after controlling for covariates.

The remaining rows of Table 3 show that resumes with male names are treated roughly equally to resumes with female names and that out-of-state resumes are much less likely to receive a positive response than in-state resumes. Whereas 5.8% of in-state resumes receive a positive response, only 3.5% of out-of-state resumes do. Furthermore, column 5 shows that this difference of 2.3 percentage points is significant at the 1% level.

Table 4 shows results for interview requests. Table 4 reveals qualitatively similar results for interview requests as seen in Table 3 for positive responses, although the magnitudes are naturally lower in Table 4 in accordance with the lower overall incidence of interview requests than positive responses more broadly defined. But this overall similarity of results suggests that the "positive response" variable and the "interview request" variable may be measuring a similar underlying construct. However, the research design provides less power in Table 4 relative to Table 3 due to the lower overall mean of the left-hand side variable. The major difference between Tables 3 and 4 is that the raw difference in the interview request rate shown in Table 4 to resumes listing colleges of differing selectivity levels is not statistically significant at conventional levels. The difference in the interview request rate between resumes listing high selectivity colleges and low selectivity colleges does, however, become significant at the 5% level when controlling for additional covariates in column 6. Due to the overall similarity in the results between the two outcomes, subsequent tables in this paper will focus on the "positive response" variable.

Table 5 stratifies by school sector. Due to the reweighting involved in Tables 3 and 4, the results in those tables are heavily driven by the public sector. Table 5 allows for an examination of charter schools and private schools, in addition to public schools. This table shows the raw positive response rate for resumes listing the various characteristics separately by sector, as well as regression results that include all of the right-hand side variables from column 6 of Table 3 and are estimated separately by sector.

Table 5 shows that having better academic qualifications is not associated with a higher likelihood of success in any of the three sectors, with the exception that college selectivity appears to matter for public schools. Thus, the results observed in Table 3 for college selectivity

are driven exclusively by public schools. This is a noteworthy result because charter and private schools are often believed to be more focused on academics than traditional public schools and to make better hiring decisions than traditional public schools due to having greater flexibility and facing more competitive pressure. On the other hand, the descriptive statistics in Table 5 make clear that the overall response rate is higher at charter schools and private schools than at traditional public schools. It is possible that the charter and private schools may be following a strategy similar to the one advocated by Staiger and Rockoff (2010), in which there are low barriers to entry when hiring teachers but high standards for retention.

Table 5 also shows that resumes listing male names were about two percentage points less likely to receive a positive response at private schools than resumes listing female names were. This difference is statistically significant at the 10% level in the regression for private schools. Charter schools were also less likely to give a positive response to a resume listing a male name compared to one listing a female name, whereas public schools were slightly more likely to give a positive response to a resume listing a male name. However, neither of these differences is statistically significant at a conventional level.

As seen in Table 5, all three sectors are much more likely to respond positively to an in-state candidate than an out-of-state candidate. Thus, any explanation for the difference in results between in-state and out-of-state candidates must be able to explain why the out-of-state disadvantage occurs in all three sectors. This casts doubt on, for example, the explanation that the difference in results between in-state and out-of-state applicants is solely due to schools believing that out-of-state applicants do not possess the appropriate state certification. This is because the out-of-state disadvantage also occurs in the private sector, despite the fact that the private sector does not generally have the same certification requirements as the public sector.

Another possibility is that all three sectors believe that out-of-state teachers are less likely to accept a job offer than in-state teachers. While this possibility cannot be entirely ruled out, it is worth noting that the labor market for teachers is very thick and so it is not clear why teachers would apply for jobs in places where they do not actually want to live. Furthermore, due to the general rigidity of teacher pay, searching for outside offers in an attempt to raise one's pay is unlikely in this market as well. Moreover, even if it is true that out-of-state candidates are on average less likely to accept an offer than in-state candidates, there are presumably some out-of-state candidates who would in fact be interested in accepting an offer. Thus, even if schools have the belief that out-of-state candidates will not accept an offer and even if this belief is correct on average, it would still be to the detriment of other out-of-state candidates who actually would be interested in teaching at the school.

Table 6 shows results stratified by school level. This table shows the raw positive response rate for resumes listing the various characteristics separately for elementary schools and secondary schools, as well as regression results that include all of the right-hand side variables from column 6 of Table 3 but are estimated separately by level. These results also reweight by sector in the same way that the results in Table 3 do. The results in Table 6 are broadly similar for the two levels, although there are some differences. The major difference is that the in-state preference seems to be coming from secondary schools. Furthermore, the variable indicating high college selectivity is significant at the 1% level in the elementary school regression and only the 10% level in the secondary school regression, although the magnitudes are similar in the two regressions.

V. Conclusion

The results of this resume audit study suggest that an applicant's academic credentials have little impact on the likelihood of success at private and charter schools, although public schools respond more favorably to candidates from more selective colleges. Additionally, private schools demonstrate a slight preference for female candidates, and all three sectors demonstrate a preference for in-state candidates.

Because teachers have such a large impact on the life trajectories of their students, staffing schools with the best teachers is a crucial public policy goal. The results of this paper may provide some with optimism regarding teacher hiring practices in the United States, but other results may be cause for concern. Because there is still so little that is known about teacher hiring practices, additional research on the topic would potentially be very valuable.

References

Aaronson, Daniel, Lisa Barrow, and William Sander (2007), "Teachers and Student Achievement in the Chicago Public High Schools," *Journal of Labor Economics* 25:1, 95-135.

Altonji, Joseph G. and Rebecca M. Blank (1999), "Race and Gender in the Labor Market," in *Handbook of Labor Economics Volume 3C*, Orley C. Ashenfelter and David Card, eds., Amsterdam: North-Holland, 3143-3259.

Antecol, Heather, Ozkan Eren, and Serkan Ozbeklik (forthcoming), "The Effect of Teacher Gender on Student Achievement in Primary School," *Journal of Labor Economics*.

Anthony, Rebecca and Gerald Roe (2003), *101 Grade A Resumes for Teachers, Third Edition*, Hauppage, NY: Barron's.

Bacolod, Marigee P. (2007), "Do Alternative Opportunities Matter? The Role of Female Labor Markets in the Decline of Teacher Quality," *Review of Economics and Statistics* 89:4, 737-751.

Ballou, Dale (1996), "Do Public Schools Hire the Best Applicants?" *Quarterly Journal of Economics* 111:1, 97-133.

Ballou, Dale and Michael Podgursky (1997), *Teacher Pay and Teacher Quality*, Kalamazoo MI: W.E. Upjohn Institute for Employment Research.

Balter, Dana and William D. Duncombe (2008), "Recruiting Highly Qualified Teachers: Do District Recruitment Policies Matter?" *Public Finance Review* 36:1, 33-62.

Bertrand, Marianne and Sendhil Mullainathan (2004), "Are Emily and Greg More Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination," *American Economic Review* 94:4, 991-1013.

Boyd, Don, Hamp Lankford, Susanna Loeb, Matthew Ronfeldt, and Jim Wyckoff (2011), "The Role of Teacher Quality in Retention and Hiring: Using Applications to Transfer to Uncover Preferences of Teachers and Schools," *Journal of Policy Analysis and Management* 30:1, 88-110.

Boyd, Donald, Hamilton Lankford, Susanna Loeb, and James Wyckoff (2005a), "Explaining the Short Careers of High-Achieving Teachers in Schools with Low-Performing Students," *American Economic Review: Papers and Proceedings of the Annual Meeting of the American Economic Association* 95:2, 166-171.

Boyd, Donald, Hamilton Lankford, Susanna Loeb, and James Wyckoff (2005b), "The Draw of Home: How Teachers' Preferences for Proximity Disadvantage Urban Schools," *Journal of Policy Analysis and Management* 24:1, 113-132.

Boyd, Donald, Hamilton Lankford, Susanna Loeb, and James Wyckoff (2013), "Analyzing the Determinants of the Matching of Public School Teachers to Jobs: Disentangling the Preferences of Teachers and Employers," *Journal of Labor Economics* 31:1, 83-117.

Brause, Rita S., Christine P. Donohue, and Alice W. Ryan (2002), *Succeeding at Your Interview: A Practical Guide for Teachers*, Mahwah, NJ: Lawrence Erlbaum Associates.

Chetty, Raj, John N. Friedman, and Jonah E. Rockoff (2014a), "Measuring the Impacts of Teachers I: Evaluating Bias in Teacher Value-Added Estimates," *American Economic Review* 104:9, 2593-2632.

Chetty, Raj, John N. Friedman, and Jonah E. Rockoff (2014b), "Measuring the Impacts of Teachers II: Teacher Value-Added and Student Outcomes in Adulthood," *American Economic Review* 104:9, 2633-2679.

Clement, Mary C. (2007), *The Definitive Guide to Getting a Teaching Job: An Insider's Guide to Finding the Right Job, Writing the Perfect Resume, and Nailing the Interview*, Lanham, MD: Rowman & Littlefield Education.

Clotfelter, Charles T., Helen F. Ladd, and Jacob L. Vigdor (2005), "Who Teaches Whom? Race and the Distribution of Novice Teachers," *Economics of Education Review* 24:4, 377-392.

Clotfelter, Charles T., Helen F. Ladd, and Jacob L. Vigdor (2006), "Teacher-Student Matching and the Assessment of Teacher Effectiveness," *Journal of Human Resources* 41:4, 778-820.

Clotfelter, Charles T., Helen F. Ladd, and Jacob L. Vigdor (2010), "Teacher Credentials and Student Achievement in High School: A Cross-Subject Analysis with Student Fixed Effects," *Journal of Human Resources* 45:3, 655-681.

Corcoran, Sean P., William N. Evans, and Robert M. Schwab (2004a), "Changing Labor-Market Opportunities for Women and the Quality of Teachers, 1957-2000," *American Economic Review: Papers and Proceedings of the Annual Meeting of the American Economic Association* 94:2, 230-235.

Corcoran, Sean P., William N. Evans, and Robert M. Schwab (2004b), "Women, the Labor Market, and the Declining Relative Quality of Teachers," *Journal of Policy Analysis and Management* 23:3, 449-470.

Darolia, Rajeev, Cory Koedel, Paco Martorell, Katie Wilson, and Francisco Perez-Arce (2014), "Do Employers Prefer Workers Who Attend For-Profit Colleges? Evidence from a Field Experiment," unpublished working paper.

Dee, Thomas S. (2005), "A Teacher Like Me: Does Race, Ethnicity, or Gender Matter?" *American Economic Review: Papers and Proceedings of the Annual Meeting of the American Economic Association* 95:2, 158-165.

Dee, Thomas S. (2007), "Teachers and the Gender Gaps in Student Achievement," *Journal of Human Resources* 42:3, 528-554.

Deming, David J. (2011), "Better Schools, Less Crime," *Quarterly Journal of Economics* 126:4, 2063-2115.

Deming, David J., Noam Yuchtman, Amira Abulafi, Claudia Goldin, and Lawrence F. Katz, "The Value of Postsecondary Credentials in the Labor Market: An Experimental Study," National Bureau of Economic Research Working Paper 20528.

Dobbie, Will (2011), "Teacher Characteristics and Student Achievement: Evidence from Teach For America," unpublished working paper.

Enelow, Wendy S. and Louise M. Kursmark (2011), *Expert Resumes for Teachers and Educators, Third Edition*, Indianapolis: JIST Works.

Engel, Mimi (2012), "The Timing of Teacher Hires and Teacher Qualifications: Is There an Association?" *Teachers College Record* 114:12, 1-29.

Engel, Mimi, Brian A. Jacob, and F. Chris Curran (2014), "New Evidence on Teacher Labor Supply," *American Educational Research Journal* 51:1, 36-72.

Eriksson, Stefan and Dan-Olof Rooth (2014), "Do Employers Use Unemployment as a Sorting Criterion When Hiring? Evidence from a Field Experiment," *American Economic Review* 104:3, 1014-1039.

Feirsen, Robert and Seth Weitzman (2004), *How to Get the Teaching Job You Want: The Complete Guide for College Graduates, Teachers Changing Schools, Returning Teachers and Career Changers*, Sterling, VA: Stylus Publishing.

Glazerman, Steven, Daniel Mayer, and Paul Decker (2006), "Alternative Routes to Teaching: The Impacts of Teach For America on Student Achievement and Other Outcomes," *Journal of Policy Analysis and Management* 25:1, 75-96.

Goldhaber, Dan (2007), "Everyone's Doing It, But What Does Teacher Testing Tell Us About Teacher Effectiveness," *Journal of Human Resources* 42:4, 765-794.

Goldhaber, Dan (2008), "Teachers Matter, But Effective Teacher Quality Policies are Elusive," in *Handbook of Research in Education Finance and Policy*, Helen F. Ladd and Edward B. Fiske, eds., New York: Routledge, 146-165.

Goldhaber, Dan, Betheny Gross, and Daniel Player (2011), "Teacher Career Paths, Teacher Quality, and Persistence in the Classroom: Are Public Schools Keeping Their Best?" *Journal of Policy Analysis and Management* 30:1, 57-87.

Goldin, Claudia, Lawrence F. Katz, and Ilyana Kuziemko (2006), "The Homecoming of American College Women: The Reversal of the College Gender Gap," *Journal of Economic Perspectives* 20:4, 133-156.

Goldin, Claudia and Cecelia Rouse (2000), "Orchestrating Impartiality: The Impact of 'Blind' Auditions on Female Musicians," *American Economic Review* 90:4, 715-741.

Gormley, William (2012), "What Our Schools Need? A Few Good Men," *USA Today* August 14, 7A.

Hanushek, Eric A. (1975), "Teacher Characteristics and Gains in Student Achievement: Estimation Using Micro Data," *American Economic Review: Papers and Proceedings of the Annual Meeting of the American Economic Association* 61:2, 280-288

Hanushek, Eric A. (2011), "The Economic Value of Higher Teacher Quality," *Economics of Education Review* 30:3, 466-479.

Harris, Douglas N., Stacey A. Rutledge, William K. Ingle, and Cynthia C. Thompson (2010), "Mix and Match: What Principals Really Look For When Hiring Teachers," *Education Finance and Policy* 5:2, 228-246.

Harris, Douglas N. and Tim R. Sass (2011), "Teacher Training, Teacher Quality and Student Achievement," *Journal of Public Economics* 95:7-8, 798-812.

Heckman, James J. and Peter Siegelman (1993), "The Urban Institute Audit Studies: Their Methods and Findings," in *Clear and Convincing Evidence: Measurement of Discrimination in America*, Michael Fix and Raymond J. Struyk, eds., Washington DC: The Urban Institute Press, 187-258.

Hougan, Eric (2011), *Road to Teaching: A Guide to Student Teacher, Teacher Training and Finding a Job*.

Hoxby, Caroline M. and Andrew Leigh (2004), "Pulled Away or Pushed Out? Explaining the Decline in Teacher Aptitude in the United States," *American Economic Review: Papers and Proceedings of the Annual Meeting of the American Economic Association* 94:2, 236-240.

Jacob, Brian A. (2002), "Where the Boys Aren't: Non-Cognitive Skills, Returns to School and the Gender Gap in Higher Education," *Economics of Education Review* 21:6, 589-598.

Jackson, C. Kirabo (2009), "Student Demographics, Teacher Sorting, and Teacher Quality: Evidence from the End of School Desegregation," *Journal of Labor Economics* 27:2, 213-256.

Jackson, C. Kirabo and Elias Bruegmann (2009), "Teaching Students and Teaching Each Other: The Importance of Peer Learning for Teachers," *American Economic Journal: Applied Economics* 1:4, 85-108.

Jepsen, Christopher and Steven Rivkin (2009), "Class Size Reduction and Student Achievement: The Potential Tradeoff between Teacher Quality and Class Size," *Journal of Human Resources* 44:1, 223-250.

Jowell, Roger and Patricia Prescott-Clarke (1970), "Racial Discrimination and White-Collar Workers in Britain," *Race* 11:4, 397-417.

Kane, Thomas J. and Douglas O. Staiger (2005), "Using Imperfect Information to Identify Effective Teachers," unpublished working paper.

Killeen, Kieran M., Susanna Loeb, and Imeh Williams (2013), "A Double Draw of Proximity: The Importance of Geography in Teacher Application and Hiring Decisions," unpublished working paper.

Koedel, Cory (2011), "Grading Standards in Education Departments at Universities," *Education Policy Analysis Archives* 19:23, 1-23.

Koedel, Cory and Eric Tyhurst (2012), "Math Skills and Labor-Market Outcomes: Evidence from a Resume-Based Field Experiment," *Economics of Education Review* 31:1, 131-140.

Kroft, Kory, Fabian Lange, and Matthew J. Notowidigdo (2013), "Duration Dependence and Labor Market Conditions: Evidence from a Field Experiment," *Quarterly Journal of Economics* 128:3, 1123-1167.

Lahey, Joanna N. (2008), "Age, Women, and Hiring: An Experimental Study," *Journal of Human Resources* 43:1, 30-56.

Lankford, Hamilton, Susanna Loeb, and James Wyckoff (2002), "Teacher Sorting and the Plight of Urban Schools: A Descriptive Analysis," *Educational Evaluation and Policy Analysis* 24:1, 37-62.

Levin, Jessica and Meredith Quinn (2003), *Missed Opportunities: How We Keep High-Quality Teachers Out of Urban Classrooms*, New York: The New Teacher Project.

Lochner, Lance and Enrico Moretti (2004), "The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports," *American Economic Review* 94:1, 155-189.

McKinney, Anne (2000), *Real –Resumes for Teachers*, Fayetteville, NC: PREP Publishing.

Murnane, Richard (1975), *The Impact of School Resources on the Learning of Inner City Children*, Cambridge MA: Ballinger.

Neumark, David, Roy J. Bank, and Kyle D. Van Nort (1996), "Sex Discrimination in Restaurant Hiring: An Audit Study," *Quarterly Journal of Economics* 111:3, 915-941.

Neumark, David (2012), "Detecting Discrimination in Audit and Correspondence Studies," *Journal of Human Resources* 47:4, 1128-1157.

Ondrich, Jan, Stephen Ross, and John Yinger (2003), "Now You See It, Now You Don't: Why Do Real Estate Agents Withhold Available Houses from Black Customers?" *Review of Economics and Statistics* 85:4, 854-873.

Oreopoulos, Philip (2011), "Why Do Skilled Immigrants Struggle in the Labor Market? A Field Experiment with Thirteen Thousand Resumes," *American Economic Journal: Economic Policy* 3:4, 148-171.

Papay, John P., Matthew A. Kraft, Julia Bloom, Kate Buckley, and David Liebowitz (2013), "Missed Opportunities in the Labor Market or Temporary Disruptions? How Late Teacher Hiring Affects Student Achievement," unpublished working paper.

Pollock, Robert (2011), *Teacher Interviews: How to Get Them & How to Get Hired! 2nd Edition*, Knoxville, TN: Advanta Publishing.

Ransom, Michael R. and David P. Sims (2010), "Estimating the Firm's Labor Supply Curve in a 'New Monopsony' Framework: Schoolteachers in Missouri," *Journal of Labor Economics* 28:2, 331-355.

Reininger, Michelle (2012), "Hometown Disadvantage? It Depends on Where You're From: Teachers' Location Preferences and the Implications for Staffing Schools," *Educational Evaluation and Policy Analysis* 34:2, 127-145.

Riach, Peter A. and Judith Rich (2006), "An Experimental Investigation of Sexual Discrimination in Hiring in the English Labor Market," *Advances in Economic Analysis & Policy* 6:2, Article 1, 1-20.

Rivkin, Steven G., Eric A. Hanushek, and John F. Kain (2005), "Teachers, Schools, and Academic Achievement," *Econometrica* 73:2, 417-459.

Rockoff, Jonah E. (2004), "The Impact of Individual Teachers on Student Achievement: Evidence from Panel Data," *American Economic Review: Papers and Proceedings of the Annual Meeting of the American Economic Association* 94:2, 247-252.

Rooth, Dan-Olof (2009), "Obesity, Attractiveness, and Differential Treatment in Hiring: A Field Experiment," *Journal of Human Resources* 44:3, 710-735.

Rothstein, Jesse (2009), "Student Sorting and Bias in Value-Added Estimation: Selection on Observables and Unobservables," *Education Finance and Policy* 4:4, 537-571.

Rothstein, Jesse (2010), "Teacher Quality in Educational Production: Tracking, Decay, and Student Achievement," *Quarterly Journal of Economics* 125:1, 175-214.

Rothstein, Jesse (forthcoming), "Teacher Quality Policy When Supply Matters," *American Economic Review*.

Rutledge, Stacey A., Douglas N. Harris, Cynthia T. Thompson, and W. Kyle Ingle (2008), "Certify, Blink, Hire: An Examination of the Process and Tools of Teacher Selection and Screening," *Leadership and Policy in Schools* 7:3, 237-263.

Staiger, Douglas O. and Jonah E. Rockoff (2010), "Searching for Effective Teachers with Imperfect Information," *Journal of Economic Perspectives* 24:3, 97-117.

Strauss, Robert P., Lori R. Bowes, Mindy S. Marks, and Mark R. Plesko (2000), "Improving Teacher Preparation and Selection: Lessons from the Pennsylvania Experience," *Economics of Education Review* 19:4, 387-415.

Warner, Jack, Clyde Bryan, and Diane Warner (2006), *Inside Secrets of Finding a Teaching Job: The Most Effective Search Methods for Both New and Experienced Educators, Third Edition*, Indianapolis: JIST Works.

Wei, Tim (2010), *I Want a Teaching Job! Guide to Getting the Teaching Job of Your Dreams*, TPW Websites.

Weichselbaumer, Doris (2003), "Sexual Orientation Discrimination in Hiring," *Labour Economics* 10:6, 629-642.

Xu, Zeyu, Jane Hannaway, and Colin Taylor (2011), "Making a Difference? The Effects of Teach For America in High School," *Journal of Policy Analysis and Management* 30:3, 447-469.

Yinger, John (1986), "Measuring Discrimination with Fair Housing Audits: Caught in the Act," *American Economic Review* 76:5, 881-893.

Table 1: Summary Statistics

Variable	Unweighted Mean	Weighted Mean
Outcomes		
Positive Response	0.0803	0.0521
Interview Request	0.0447	0.0322
Resume Characteristics		
High GPA	0.3255	0.3173
Medium GPA	0.3438	0.3440
Low GPA	0.3307	0.3387
High College Selectivity	0.3298	0.3255
Medium College Selectivity	0.3442	0.3491
Low College Selectivity	0.3260	0.3253
Male	0.5000	0.4962
Out-of-State	0.2565	0.2637
Science	0.1200	0.1045
School Characteristics		
Secondary School	0.4663	0.4218
Charter School	0.3333	0.0301
Private School	0.3333	0.0807
Traditional Public School	0.3333	0.8892
Fraction Underrepresented Minority	0.3479	0.3499
Located in City	0.3937	0.2495
Located in Suburb	0.3007	0.2971
Located in Town	0.1007	0.1318
Located in Rural Area	0.2050	0.3216

Notes: The sample size is 6,000. The unweighted standard deviation of the "Fraction Underrepresented Minority" variable is 0.3619, and the weighted standard deviation is 0.3348. All other variables are binary.

Table 2: Positive Response Rate and Interview Request Rate by School Characteristics

	N	Positive	Interview
By Urbanicity			
City	2362	0.097	0.056
Suburb	1804	0.072	0.033
Town	604	0.071	0.040
Rural	1230	0.065	0.043
By Urbanicity (Public Schools Only)			
City	450	0.053	0.044
Suburb	582	0.033	0.014
Town	276	0.080	0.047
Rural	692	0.043	0.030
By School Enrollment Quartile			
< 165	1494	0.090	0.054
165-329	1496	0.085	0.047
330-549	1508	0.076	0.034
> 549	1502	0.071	0.044
By School Enrollment Quartile (Public Schools Only)			
< 266	500	0.052	0.038
266-453	500	0.050	0.034
454-646	498	0.048	0.018
> 646	502	0.040	0.034
By District Enrollment Quartile (Public Schools Only)			
< 1991	500	0.042	0.026
1991-6499	500	0.058	0.028
6500-25777	500	0.038	0.028
> 25777	500	0.052	0.042

Table 3: Determinants of Positive Responses

	Rate	Regression Coefficients				
Variable	(1)	(2)	(3)	(4)	(5)	(6)
High GPA	0.0503	-0.0043				-0.0073
		(0.0104)				(0.0099)
Medium GPA	0.0513	-0.0034				-0.0029
		(0.0100)				(0.0095)
Low GPA	0.0546	-				-
High College Selectivity	0.0689		0.0323***			0.0379***
			(0.0100)			(0.0102)
Medium College Selectivity	0.0509		0.0144			0.0184**
			(0.0090)			(0.0091)
Low College Selectivity	0.0366		-			-
Male	0.0546			0.0050		0.0073
				(0.0081)		(0.0081)
Female	0.0496			-		-
Out-of-State	0.0353				-0.0229***	-0.0242***
					(0.0087)	(0.0087)
In-State	0.0581				-	-
Additional Controls?	-	No	No	No	No	Yes
N	-	6,000	6,000	6,000	6,000	6,000

Notes: Column 1 shows the rate at which resumes listing the various characteristics received a positive response, and columns 2-6 show regression results. All results are reweighted by sectoral enrollment. Additional controls in column 6 are a dummy for whether the resume lists an additional certification in science; the fraction of students at the school that are underrepresented minorities; and dummies for school level, sector, urbanicity, and state. Standard errors that are robust to clustering at the school level are in parentheses. A single asterisk denotes significance at the 10% level, a double asterisk denotes significance at the 5% level, and a triple asterisk denotes statistical significance at the 1% level.

Table 4: Determinants of Interview Requests

	Rate	Regression Coefficients				
Variable	(1)	(2)	(3)	(4)	(5)	(6)
High GPA	0.0296	-0.0037				-0.0069
		(0.0085)				(0.0080)
Medium GPA	0.0333	-0.0000				0.0004
		(0.0084)				(0.0079)
Low GPA	0.0333	-				-
High College Selectivity	0.0379		0.0131			0.0173**
			(0.0080)			(0.0081)
Medium College Selectivity	0.0337		0.0090			0.0107
			(0.0078)			(0.0077)
Low College Selectivity	0.0247		-			-
Male	0.0326			0.0008		0.0024
				(0.0063)		(0.0063)
Female	0.0317			-		-
Out-of-State	0.0179				-0.0193***	-0.0206***
					(0.0068)	(0.0067)
In-State	0.0373				-	-
Additional Controls?	-	No	No	No	No	Yes
N	-	6,000	6,000	6,000	6,000	6,000

Notes: Column 1 shows the rate at which resumes listing the various characteristics received an interview request, and columns 2-6 show regression results. All results are reweighted by sectoral enrollment. Additional controls in column 6 are a dummy for whether the resume lists an additional certification in science; the fraction of students at the school that are underrepresented minorities; and dummies for school level, sector, urbanicity, and state. Standard errors that are robust to clustering at the school level are in parentheses. A single asterisk denotes significance at the 10% level, a double asterisk denotes significance at the 5% level, and a triple asterisk denotes statistical significance at the 1% level.

Table 5: Determinants of Positive Responses by Sector

	Public Schools		Charter Schools		Private Schools	
Variable	Rate	Regression Coefficients	Rate	Regression Coefficients	Rate	Regression Coefficients
High GPA	0.0459	-0.0078	0.1042	-0.0123	0.0770	-0.0063
		(0.0112)		(0.0182)		(0.0142)
Medium GPA	0.0465	-0.0043	0.1152	-0.0017	0.0798	-0.0041
		(0.0107)		(0.0176)		(0.0145)
Low GPA	0.0500	-	0.1215	-	0.0831	-
High College Selectivity	0.0664	0.0424***	0.1165	-0.0049	0.0786	0.0057
		(0.0116)		(0.0177)		(0.0145)
Medium College Selectivity	0.0456	0.0195*	0.1052	-0.0147	0.0910	0.0157
		(0.0103)		(0.0172)		(0.0148)
Low College Selectivity	0.0307	-	0.1193	-	0.0700	-
Male	0.0515	0.0118	0.1020	-0.0201	0.0706	-0.0204*
		(0.0092)		(0.0143)		(0.0119)
Female	0.0436		0.1248		0.0898	
		-		-		-
Out-of-State	0.0321	-0.0229**	0.0920	-0.0272*	0.0511	-0.0349***
		(0.0099)		(0.0160)		(0.0122)
In-State	0.0531	-	0.1207	-	0.0899	-
Additional Controls?	-	Yes	-	Yes	-	Yes
N	-	2,000	-	2,000	-	2,000

Notes: The table shows the raw rate at which resumes listing various characteristics received a positive response as well as regression results, both broken down by sector. The regressions include the full set of controls from column 6 of Table 3. Standard errors that are robust to clustering at the school level are in parentheses. A single asterisk denotes significance at the 10% level, a double asterisk denotes significance at the 5% level, and a triple asterisk denotes statistical significance at the 1% level.

Table 6: Determinants of Positive Responses by Level

	Elementary Schools		Secondary Schools	
Variable	Rate	Regression Coefficients	Rate	Regression Coefficients
High GPA	0.0530	0.0061	0.0468	-0.0260
		(0.0123)		(0.0167)
Medium GPA	0.0456	0.0005	0.0597	-0.0037
		(0.0125)		(0.0153)
Low GPA	0.0430	-	0.0699	-
High College Selectivity	0.0626	0.0378***	0.0783	0.0336*
		(0.0124)		(0.0175)
Medium College Selectivity	0.0479	0.0216**	0.0550	0.0103
		(0.0108)		(0.0150)
Low College Selectivity	0.0298	-	0.0455	-
Male	0.0504	0.0121	0.0602	0.0007
		(0.0104)		(0.0126)
Female	0.0438	-	0.0579	-
Out-of-State	0.0388	-0.0107	0.0296	-0.0425***
		(0.0111)		(0.0145)
In-State	0.0502	-	0.0685	-
Additional Controls?	-	Yes	-	Yes
N	-	3,202	-	2,798

Notes: The table shows the raw rate at which resumes listing various characteristics received a positive response as well as regression results, both broken down by level. All results are reweighted by sectoral enrollment. The regressions include the full set of controls from column 6 of Table 3. Standard errors that are robust to clustering at the school level are in parentheses. A single asterisk denotes significance at the 10% level, a double asterisk denotes significance at the 5% level, and a triple asterisk denotes statistical significance at the 1% level.