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

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First Draft: March 1, 2013
This Draft: May 2, 2013

Abstract: Teacher quality is a pressing public policy concern, yet there is little evidence on how effective schools are at selecting teachers. 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 credentials have little impact on the likelihood of success, that schools may display a slight preference for female applicants, and that schools display a strong aversion to out-of-state applicants. Interestingly, some of these results may be stronger at private and charter schools than at traditional public schools.

Keywords: resume audit studies, teacher labor markets
JEL Classification: I21, J45

* I thank Duncan Chaplin, John Friedman, Fabian Lange, Jesse Rothstein, John Yinger, seminar participants at Georgetown University, and conference participants at the 2013 Association for Education Finance and Policy conference for helpful discussions and comments. I thank Malini Silva and Robert Wood for research assistance.
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I. Introduction

A growing body of empirical work documents the enormous heterogeneity in quality amongst classroom teachers.[1] Recent work by Chetty, Friedman, and Rockoff (2011) further finds that teacher quality in the early grades affects even 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. Unsurprisingly, there is a concerted effort to raise teacher quality. Programs like Teach for America have the goal of encouraging academically-talented recent college graduates to become teachers, and merit pay policies that are in place in some districts aim to have individuals who would be effective teachers select into the teaching profession. 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, little is known about how effective schools are in screening applicants or about what characteristics they seek in potential teachers.[2] The goal of this paper is to shed some light on these issues.

[1] The standard references include Aaronson, Barrow, and Sander (2007); 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.

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

This paper reports the results of a randomized controlled experiment that attempts to determine what characteristics schools value in applicants for teaching positions and whether there are any systematic inefficiencies in the hiring process. In particular, I sent out 6,000 fictitious resumes to randomly-selected schools across the United States, along with cover letters that expressed an interest in being hired for a teaching position. The resumes attempt to experimentally manipulate the demand side's perceptions of a candidate's academic credentials, 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 credentials have little impact on the likelihood of success, that schools may display a slight preference for female applicants, and that schools display a strong aversion to out-of-state applicants. Interestingly, some of these results may be stronger at private and charter schools than at traditional public schools.

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 and Jacob 2011; 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 2012; Staiger and Rockoff 2010). There is less work on how effective schools are at screening teachers under their current personnel policies. However, Kane and Staiger (2005) find that the students of 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 the students of teachers hired the previous year as part of a much smaller cohort of teachers. This provides indirect evidence that the district was not effective in screening teachers because, if the district were effective in doing so, one might expect the marginal teacher to be worse than the average teacher and for average teacher quality to fall as more teachers are hired.[3] Additionally, a report by the New Teacher Project finds that a delayed hiring process causes many large urban districts to miss out on qualified applicants (Levin and Quinn 2003).

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. But 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

[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."

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 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.

Boyd et al. (2011) attempts 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. The general results in Boyd et al. (2011) are thus in contrast to Ballou (1996). However, using a sample of teachers who have applied for transfers creates a possible sample selection issue, and there is also a potential for omitted variable bias if those doing the hiring have access to different information (for example, information acquired from an in-person interview) about the candidates than the researchers do.[4] An additional limitation of Boyd et al. (2011) is that the authors do not have information on job offers that are declined. Thus, much like Ballou (1996), the authors are to some extent using observational data on the outcome of the market to identify the preferences of one side of the market. However, it is notable that the authors are able to employ information about applications to particular schools and do know that teachers have expressed some interest in those schools by applying for positions in them. Furthermore, one could argue that if academically-talented

[4] One might argue that the issue of omitted variable bias in this case is inconsequential because what is important is that teachers with certain characteristics (such as high academic ability) are hired by schools, regardless of whether they are hired because of those characteristics or because they possess other characteristics that are correlated with them. But even in this case, it should still be of interest for understanding hiring behavior to know the *ceteris paribus* effects of academic ability.

teachers have better outside options, schools' preferences for academically-talented teachers may actually be even greater than Boyd et al. (2011) estimate.

Boyd et al. (2013) use 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 in an attempt to understand teachers' preferences over schools and schools' preferences over teachers. The results of this paper also suggest that schools value teachers with higher test scores and who attended more selective colleges, although it is difficult to know how robust these results are to the particular modeling assumptions employed. Nonetheless, it is worth noting that Boyd et al. (2013) finds similar results to Boyd et al. (2011) despite using different data and a different methodology. The present paper seeks to further this line of work by randomly assigning academic qualifications to resumes, sending them to specific schools, and then being able to monitor any type of response from those particular schools. This should allow for a clean identification of the preferences of schools over candidates at the initial screening stage.

There is also a small body of research on the 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." Although many people in occupations other than teaching work near where they grew up, Reininger (2012) finds that teachers are unique in this regard relative to those in other occupations that require a similar level of education. For example, based on data from the National Education Longitudinal Study of 1988, she finds that "across the country, the median distance moved by teachers [relative to where they lived in 10^{th} 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." All of these statistics may suggest that schools are casting a narrow net when searching for teachers. If so, this may be problematic because a broader search may result in better candidates. However, an alternative explanation for these statistics is that the candidates themselves might 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. The authors rely on this measure of teacher geographic location due to data limitations and there may be questions about whether it is the correct measure, but the authors support this measure by noting that teachers ordinarily apply for certification before they begin applying for jobs. Also noteworthy is Killeen, Loeb, and Williams (2013), who use job application data from Vermont and find that both teachers and schools have a preference for geographic proximity.[5] 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 has found 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

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

are men.[6] 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 because it is soft skills, rather than academic ability, that determine success as a teacher.

Although there is not a universal consensus on the topic, most evidence suggests that academically-talented teachers are better in the classroom. For example, a recent review article by Goldhaber (2008) states, "While there are fewer studies predicting student achievement that include measures of teacher academic proficiency than those that include degree and experience levels, the existing research is relatively consistent in showing a positive relationship between the two." And Hoxby and Leigh (2004) state, "Logic suggests that a teacher's value-added is related to her academic aptitude." Particular studies that have found a positive relationship between student achievement and either the test score or the undergraduate institution quality of their teachers include Clotfelter, Ladd, and Vigdor (2010); Goldhaber (2007); and Jackson and Bruegmann (2009). 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.

[6] 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*.

Additional evidence in favor of the proposition that academically-talented teachers are better teachers comes from recent studies of Teach for America. Teach for America seeks to place high-ability recent college graduates as teachers in high-poverty schools. A recent evaluation of Teach for America 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). Xu, Hannaway, and Taylor (2011) is an observational study that 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 themselves go on to have a positive effect on student math test scores.

On the issue of gender, Dee (2005, 2007) finds that there are academic benefits when students are matched with a teacher of the same gender as themselves. This is noteworthy given that males now lag behind females in 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.

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 in order 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 how employers weigh unemployment spells of various durations (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 an unnatural way that leads to the results they believe the experimenter wants to find.[7] 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.

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

III. Methodology

A. Selecting the Sample

The first step of this resume audit study was to select the schools involved. After consulting previous resume audit studies, performing some rough power calculations, and conducting a small pilot study, I opted for a sample of 3,000 schools to receive two resumes each. The schools were selected at random from the 2009-10 Common Core of Data and the 2009-10 Private School Survey. These data sets are intended to form a complete census of schools in the United States. The 2009-10 data were the most recent available data 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 and were selected for the sample with a probability proportional to student enrollment.[8]

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.[9] I then created one-page resume templates that were similar in style to the actual resumes I consulted.

[8] 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.

[9] 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, 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 that were to be sent to elementary schools listed a major and certification in elementary education. All resumes that were to be 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).[10] 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.[11] The out-of-state resumes were assigned a college in

[10] 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.

[11] 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).[12] 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.

[12] 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. 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 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). Finally, 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. 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.[13] 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 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.

[13] 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.

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).[14] The four large urban districts studied in a recent report by the New Teacher Project all still had vacancies after the school year has 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 until September 30, 2012. 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 information, or a request to apply for or interview for a different position (e.g., a substitute teaching position.)

[14] 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.

E. Models and Estimators

Due to the random assignment of the resume characteristics, the analysis of the data is relatively simple and straightforward. Estimating the equation

$$positive_i = \beta_0 + \beta_1 \cdot highGPA_i + \beta_2 \cdot mediumGPA_i + \beta_3 \cdot highselectivity_i + \beta_4 \cdot mediumselectivity_i + \beta_5 \cdot female_i + \beta_6 \cdot outofstate_i + \epsilon_i \quad (1)$$

by ordinary least squares should result in unbiased estimates.[15] The unit of observation is a resume. Here $positive_i$ is a dummy for receiving a positive response to a resume, $highGPA_i$ is a dummy for the resume listing a GPA of 3.9, $mediumGPA_i$ is a dummy for the resume listing a GPA of 3.5, $highselectivity_i$ is a dummy for the resume belonging to the high selectivity tier, $mediumselectivity_i$ is a dummy for the resume belonging to the medium selectivity tier, $female_i$ is a dummy for the resume listing a female name, $outofstate_i$ is a dummy for the resume coming from out of state, ϵ_i is the error term, 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 treatment variables in isolation and some models that control for covariates, although neither of these decisions has much impact on the point estimates. In practice, the effects on the standard errors are nominal as well. In addition, I explore heterogeneity by school sector and between elementary and secondary schools.

IV. Results

Table 1 shows summary statistics. All variables except for the "Fraction Underrepresented Minority" variable are binary, so only means are shown in the main body of

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

the table. The table indicates that roughly 4.3% of resumes sent received an interview request. When I define "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 7.9%. These figures are lower than the corresponding figures in previous resume audit studies, which is not altogether unsurprising given that the resumes in this experiment were not sent in response to posted positions. What is perhaps more surprising is that these 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%. 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.

The main regression results for the "positive response" variable are given in Table 2. The first four columns of this table consider each of the four main sets of treatment variables in isolation, the fifth column combines all of the treatments into one regression, the sixth column adds additional covariates, and the seventh column includes a full set of dummies identifying what state the receiving school is in. Consistent with the random assignment of resume characteristics, the coefficients on the treatment variables do not change much from one column to another. The results suggest that having strong academic credentials does not help candidates a great deal. In fact, candidates with higher GPAs were actually less likely to receive a positive response than those with lower GPAs, although this result is not statistically significant at conventional levels. But this result 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. The results in Table 2 may thus suggest even less benefit of having strong academic credentials than Ballou (1996) does. The results in Table 2 also suggest that female candidates are more successful than male candidates, although this is only significant at the 10% level.[16] Furthermore, candidates from a different state than the receiving school is located in have a roughly three percentage point lower chance of receiving a positive response than an in-state candidate does, and this result is highly statistically significant. The coefficients on the additional covariates suggest that charter schools and private schools are more likely to give a positive response than public schools are and that schools with a higher share of underrepresented minority students are more likely to give a positive response than schools with a lower share are.

Table 3 explores the results in greater detail by estimating whether there are differences by school sector. This table shows the results of three regressions, one for each sector. These regressions include the full set of control variables from column 7 of Table 2, including the state indicator variables. The results suggest that public schools may actually have a preference for more academically talented teachers, at least when academic talent is measured by the selectivity level of the college the applicant attended. On the other hand, charter and private schools do not seem to have this preference. If true, this result is interesting because charter and private schools are often believed to have more flexibility than, and consequently make better hiring decisions than, traditional public schools. The results of Table 3 also suggest that any preference for

[16] In results not shown here, I also regressed the outcome variables used in this study on dummies for the particular first and last names used in the resumes. Results from F-tests suggest no differences between individual names.

female candidates in the experiment is driven by private schools and perhaps charter schools. Finally, all three sectors appear to have a preference for in-state candidates. This result is noteworthy because one potential reason why the out-of-state candidates may be disfavored is that, despite the claims on the resumes that the applicants have the correct certification, public schools may believe that the candidates are not licensed in the correct state. However, this should not be a factor at charter and private schools, where state certification is generally not required. Whatever the reason for the more positive response given to in-state candidates, it must be something that affects all three sectors. One possibility is that schools may believe that out-of-state teachers are not actually interested in coming. However, 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.

Table 4 explores whether there are differences between elementary schools and secondary schools. The table reports the results of two regressions, one for each level. These regressions include the full set of right-hand side variables from column 7 of Table 2. The results are broadly similar for the two levels, although there are some differences. For example, having a high GPA is associated with lower callbacks at the secondary level but not the elementary level. Furthermore, the slight preference for female teachers seen in Table 2 appears to be coming from the secondary level. Tables 5-7 mirror Tables 2-4 except they use a dummy for an actual interview request for the desired position as the left-hand side variable. Despite the potential concern that these estimates would be imprecise or that the magnitudes would be muted due to the overall lower incidence of interview requests than positive responses more broadly defined, the estimates in these tables are similar to those in the earlier tables.

V. Conclusion

The results from this resume audit study suggest that an applicant's academic credentials have little impact on the likelihood of success, that schools may display a slight preference for female applicants, and that schools display a strong aversion to out-of-state applicants. Interestingly, some of these results may be more pronounced at private and charter schools than at traditional public schools. 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. However, some of the results in this paper suggest that there may be cause for concern regarding teacher hiring practices in the United States.

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Table 1: Summary Statistics

Variable	*Mean*
Positive Response	0.0787
Interview Request	0.0433
High GPA	0.3255
Medium GPA	0.3438
High College Selectivity	0.3298
Medium College Selectivity	0.3442
Female	0.5000
Out of State	0.2565
Science	0.1200
Secondary School	0.4663
Charter School	0.3333
Private School	0.3333
Fraction Underrepresented Minority	0.3479
City	0.3937
Suburb	0.3007
Town	0.1007

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

Table 2: Determinants of Positive Responses

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
High GPA	-0.0084				-0.0084	-0.0098	-0.0083
	(0.0086)				(0.0086)	(0.0085)	(0.0085)
Medium GPA	-0.0037				-0.0025	-0.0021	-0.0007
	(0.0084)				(0.0084)	(0.0083)	(0.0082)
High College Selectivity		0.0113			0.0119	0.0121	0.0129
		(0.0084)			(0.0084)	(0.0084)	(0.0084)
Medium College Selectivity		0.0068			0.0072	0.0080	0.0082
		(0.0083)			(0.0083)	(0.0082)	(0.0082)
Female			0.0120*		0.0122*	0.0125*	0.0119*
			(0.0070)		(0.0070)	(0.0069)	(0.0070)
Out of State				-0.0289***	-0.0293***	-0.0289***	-0.0269***
				(0.0072)	(0.0072)	(0.0072)	(0.0072)
Science						0.0216*	0.0208
						(0.0131)	(0.0130)
Secondary School						-0.0024	-0.0022
						(0.0083)	(0.0083)
Charter School						0.0555***	0.0517***
						(0.0101)	(0.0106)
Private School						0.0376***	0.0423***
						(0.0094)	(0.0096)
Fraction Underrepresented Minority						0.0317**	0.0330**
						(0.0150)	(0.0159)
Urbanicity Dummies?	No	No	No	No	No	Yes	Yes
State Dummies?	No	No	No	No	No	No	Yes
N	6,000	6,000	6,000	6,000	6,000	6,000	6,000

Notes: Standard errors that are robust to clustering at the state 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 3: Determinants of Positive Responses by Sector

Variable	Public	Charter	Private
High GPA	-0.0092	-0.0159	-0.0028
	(0.0112)	(0.0181)	(0.0139)
Medium GPA	-0.0045	-0.0030	-0.0043
	(0.0107)	(0.0175)	(0.0140)
High College Selectivity	0.0409***	-0.0059	0.0017
	(0.0115)	(0.0177)	(0.0144)
Medium College Selectivity	0.0197*	-0.0147	0.0160
	(0.0103)	(0.0170)	(0.0147)
Female	-0.0109	0.0188	0.0215*
	(0.0091)	(0.0143)	(0.0118)
Out of State	-0.0221**	-0.0279*	-0.0309**
	(0.0098)	(0.0158)	(0.0120)
Science	0.0398*	0.0212	0.0036
	(0.0210)	(0.0239)	(0.0216)
Secondary School	0.0029	0.0028	0.0013
	(0.0111)	(0.0173)	(0.0155)
Fraction Underrepresented Minority	0.0604**	0.0339	-0.0244
	(0.0238)	(0.0297)	(0.0407)
Urbanicity Dummies?	Yes	Yes	Yes
State Dummies?	Yes	Yes	Yes
N	2,000	2,000	2,000

Notes: Standard errors that are robust to clustering at the state 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 Positive Responses by Level

Variable	Elementary	Secondary
High GPA	0.0047	-0.0251**
	(0.0116)	(0.0125)
Medium GPA	0.0034	-0.0053
	(0.0110)	(0.0126)
High College Selectivity	0.0124	0.0152
	(0.0117)	(0.0123)
Medium College Selectivity	0.0058	0.0111
	(0.0111)	(0.0126)
Female	0.0056	0.0177*
	(0.0092)	(0.0106)
Out of State	-0.0200**	-0.0364***
	(0.0096)	(0.0111)
Science		0.0223*
		(0.0131)
Charter School	0.0592***	0.0451***
	(0.0150)	(0.0159)
Private School	0.0590***	0.0275*
	(0.0130)	(0.0145)
Fraction Underrepresented Minority	0.0440*	0.0251
	(0.0227)	(0.0228)
Urbanicity Dummies?	Yes	Yes
State Dummies?	Yes	Yes
N	3,202	2,798

Notes: Standard errors that are robust to clustering at the state 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 Interview Requests

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
High GPA	-0.0059				-0.0059	-0.0069	-0.0066
	(0.0064)				(0.0063)	(0.0063)	(0.0063)
Medium GPA	-0.0003				0.0005	0.0019	0.0023
	(0.0065)				(0.0064)	(0.0063)	(0.0062)
High College Selectivity		0.0041			0.0046	0.0054	0.0059
		(0.0064)			(0.0064)	(0.0063)	(0.0063)
Medium College Selectivity		0.0017			0.0020	0.0031	0.0030
		(0.0062)			(0.0062)	(0.0061)	(0.0061)
Female			0.0080		0.0082	0.0087*	0.0081
			(0.0053)		(0.0052)	(0.0052)	(0.0052)
Out of State				-0.0216***	-0.0219***	-0.0218***	-0.0205***
				(0.0053)	(0.0053)	(0.0053)	(0.0053)
Science						0.0165	0.0167
						(0.0110)	(0.0109)
Secondary School						0.0149**	0.0147**
						(0.0063)	(0.0063)
Charter School						0.0312***	0.0253***
						(0.0082)	(0.0086)
Private School						0.0106	0.0121*
						(0.0066)	(0.0066)
Fraction Underrepresented Minority						0.0497***	0.0479***
						(0.0118)	(0.0122)
Urbanicity Dummies?	No	No	No	No	No	Yes	Yes
State Dummies?	No	No	No	No	No	No	Yes
N	6,000	6,000	6,000	6,000	6,000	6,000	6,000

Notes: Standard errors that are robust to clustering at the state 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 Interview Requests by Sector

Variable	Public	Charter	Private
High GPA	-0.0092	-0.0113	0.0004
	(0.0090)	(0.0143)	(0.0083)
Medium GPA	-0.0012	-0.0020	0.0071
	(0.0090)	(0.0142)	(0.0086)
High College Selectivity	0.0175*	-0.0127	0.0132
	(0.0092)	(0.0143)	(0.0089)
Medium College Selectivity	0.0118	-0.0160	0.0109
	(0.0087)	(0.0139)	(0.0081)
Female	-0.0043	0.0096	0.0153*
	(0.0071)	(0.0116)	(0.0078)
Out of State	-0.0201***	-0.0318***	-0.0119
	(0.0076)	(0.0123)	(0.0073)
Science	0.0243	0.0087	0.0192
	(0.0175)	(0.0212)	(0.0169)
Secondary School	0.0101	0.0235*	0.0192**
	(0.0091)	(0.0141)	(0.0096)
Fraction Underrepresented Minority	0.0462**	0.0546**	0.0138
	(0.0199)	(0.0248)	(0.0210)
Urbanicity Dummies?	Yes	Yes	Yes
State Dummies?	Yes	Yes	Yes
N	2,000	2,000	2,000

Notes: Standard errors that are robust to clustering at the state 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 7: Determinants of Interview Requests by Level

Variable	Elementary	Secondary
High GPA	0.0068	-0.0217**
	(0.0074)	(0.0103)
Medium GPA	0.0084	-0.0051
	(0.0072)	(0.0108)
High College Selectivity	0.0013	0.0135
	(0.0078)	(0.0103)
Medium College Selectivity	0.0007	0.0074
	(0.0074)	(0.0102)
Female	0.0048	0.0110
	(0.0062)	(0.0087)
Out of State	-0.0099	-0.0349***
	(0.0065)	(0.0086)
Science		0.0178
		(0.0110)
Charter School	0.0253**	0.0286**
	(0.0112)	(0.0135)
Private School	0.0180**	0.0096
	(0.0073)	(0.0116)
Fraction Underrepresented Minority	0.0557***	0.0389**
	(0.0160)	(0.0187)
Urbanicity Dummies?	Yes	Yes
State Dummies?	Yes	Yes
N	3,202	2,798

Notes: Standard errors that are robust to clustering at the state 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.