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Choosing Where to Teach: The Effect of Teacher Quality on the Charter Versus Public School Decision

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Choosing Where to Teach: The Effect of Teacher Quality on the Charter Versus Public School Decision Job Market Paper

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Abstract

This paper combines restricted-use data from the 2007-2008 SASS and a disaggregated measure of teacher quality based on undergraduate institutional quality to determine where high quality teachers choose to teach. Higher quality teachers are more likely to teach at charter schools versus public schools than are lower quality teachers. This effect generally increases with quality. Among the youngest cohort of teachers, those who are of the highest quality are 11 percentage points more likely to choose a charter school than their lower quality counterparts. These findings suggest that traditional public schools may be at a growing disadvantage in attracting teachers who graduate from the best universities.

Keywords: Teacher Quality; Charter Schools; Teacher Sorting; Teacher; Schools and Staffing Survey; School Choice

JEL Codes: I21; J21; J4

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1 Introduction

Since their inception in 1992, charter schools have grown to operate over 5,000 schools in 39 states and the District of Columbia (Center for Education Reform 2010). Charters are a free alternative choice for parents. They are publicly funded and have more autonomy and greater accountability than traditional public schools (henceforth, public or traditional schools). Charters may have different academic focuses or may target different student populations.

Opponents to the charter school movement believe that charters may drain resources from traditional schools (Dillon 2010). Teachers are a key input into the education production function (see for example, Aaronson et al. 2002, Ferguson 1991, Ferguson and Ladd 1996, Goldhaber 2002, Goldhaber et al. 1999, Hanushek et al. 1999, Hanushek and Rivkin 2003, Hanushek 1992, Hanushek 1971, Rivkin et al. 2005, Rockoff 2004), with teacher quality associated with 7% of the variance in student achievement gains (Rivkin et al. 2005). One way to address if charters drain resources is to investigate where quality teachers are more abundant, at charter or public schools? Also, teachers may have faced different choice sets depending upon when they graduated from college, before or after the introduction of charter schools in the early- to mid-1990s. Depending upon when a teacher graduated from college, is there a difference in the probability of teaching at a charter versus a public school for different quality teachers?

This paper's main contribution is the investigation of sorting decisions among different quality teachers and different cohorts of teachers using data from the 2007-2008 Schools and Staffing Survey (SASS). This paper also makes two secondary methodological contributions. It demonstrates that teacher quality should be measured by the competitiveness of the teacher's undergraduate college at the time of enrollment because college competitiveness is not constant over time. In addition, teacher quality should be measured as precisely as possible because aggregate quality classifications obscure distinctions in the choices made by teachers of different underlying quality.

This paper is organized as follows: Section 2 gives the background of teacher quality measurement, and section 3 describes college competitiveness. Section 4 discusses teacher quality. Section 5 illustrates perceived and real differences in charter and public schools. Section 6 details the estimation strategy. Section 7 discusses the study findings. Finally, section 8 concludes.

2 Teacher Quality Background

Measuring teacher quality is extremely difficult. Most characteristics of effective teachers such as passion, enthusiasm, work ethic, and people skills, are not easily measurable. Even so, studies have tried to find

quantitative and observable ways of measuring quality. Licensure, testing, certification, and advanced degrees are considered observable measures of quality but are not consistently associated with improvements in student outcomes or teacher quality (Angrist and Guryan 2008, Angrist and Guryan 2004, Berliner 2005).

On the other hand, studies have found that a teacher’s innate ability and intelligence are associated with positive gains in student outcomes. They have established measures of intelligence, including the teacher’s SAT/ACT scores or college competitiveness as good indicators of effectiveness (Angrist and Guryan 2004, Coleman et al. 1966, Ehrenberg and Brewer 1994). The competitiveness of a teacher’s college is a common proxy for measuring teacher quality (Bacolod 2007a, Ballou 1996, Ballou and Podgursky 1997, Ballou and Podgursky 1995, Baker and Dickerson 2006, Boyd et al. 2010, Boyd et al. 2003, Carruthers 2009, Clotfelter et al. 2006, Ehrenberg and Brewer 1994, Figlio 1997, Podgursky et al. 2004)¹. The majority of these studies utilize the rankings from *Barron’s Profiles of American Colleges*, which categorizes undergraduate institutions into one of 6 tiers: Most Competitive, Highly Competitive, Very Competitive, Competitive, Less Competitive, and Non Competitive. Other studies use similar rankings, such as the UCLA Higher Education Research Institute’s ranking (Bacolod 1997a) or a measure by Lovejoy (Figlio 1997).

Most studies implementing college competitiveness as a proxy for teacher quality create aggregates of the original six Barron’s categories, though the aggregations are not consistent. For example, Baker and Dickerson (2006) and Lankford et al. (2002) consider teacher quality to be dichotomous, aggregating the top two tiers together and all other ranks together. Carruthers (2009) also treats quality to be dichotomous, though she aggregates all teachers graduating from the top four tiers together. Meanwhile, Clotfelter et al. (2006) create three aggregations: teachers from the top three tiers form the top group, those from competitive colleges are the middle group, and those from the lowest two tiers comprise the final group. Ehrenberg and Brewer (1994), who provide the evidence that increases in teacher quality, as measured by the Barron’s ranking, does significantly improve students’ outcomes, do not aggregate quality ranks, nor does Hoxby (2002).

While aggregating quality categories is common, most studies do not explain why they do it. Some studies aggregate because their samples, especially among the higher ranks, are small (Podgursky et al. 2004), as individuals who attend more competitive colleges or who have higher standardized test scores are less likely to be teachers (Ballou 1996, Hanushek and Pace 1995). Studies do not address if aggregations are masking effects of finer quality levels on their outcomes.

¹Some studies use the average SAT/ACT score of where the teacher attended college instead of the college’s competitiveness rank. See, for example, Figlio (2002), Hoxby and Leigh (2004), and Podgursky et al. (2004).

3 College Rankings

Most studies proxying for quality with college rankings use a single year, or a reference year, of rankings. Most do not choose the reference year corresponding to when their teachers attended college. Few even mention their reference year. Of those that do, some studies choose a year that is the closest to when their median teachers attended (Hoxby 2002) or entered (Carruthers 2009) college. The reference year chosen could affect results if competitiveness changes over time, as teachers could be assigned an incorrect quality measure, something most studies ignore. If competitiveness changes, measurement error would lead to attenuation bias in study results.

This study uses the college rankings from *Barron's Profiles of American Colleges*, which ranks all four year institutions which offer bachelor's degrees if they are fully accredited or are recognized as candidates for accreditation. Ranks are based on incoming freshmen characteristics, such as high school class rank, SAT/ACT scores, GPA, and acceptance rate, from the academic year prior to the publication year. For example, the 1996 rankings are based on the characteristics of the entering freshmen of the 1995-1996 academic year. The first year of publication was 1964, and the Profiles are revised biennially.

This study compiled a dataset of rankings for the publication years 1970, 1984, 1986, 1992, 1994, 1996, 1998, 2000, and 2002. These years correspond to when the teachers of most interest in the SASS entered college. Charter schools first opened in 1992, with the bulk of states passing charter laws between 1993-1998². Teachers graduating after 1992 will have had the charter option in their choice set at the onset of employment. Accordingly, the ranking dataset consists of rankings since the inception of charters along with a subset of previous rankings. Earlier rankings allow competitiveness to be tracked over time to determine if it changes. More earlier years were not included as established teachers will have little incentive to leave their schools, while newer teachers have more perceived flexibility and are of the most interest to this study.

This study identified the Barron's ranked colleges IPEDS codes from the National Center of Education Statistics (NCES) for use in merging the rankings to the SASS data. It dropped specialized colleges (e.g., religious or arts schools), those that closed or merged, colleges with multiple campuses that are not uniquely identifiable in both datasets, and foreign colleges from the analysis.

Simple correlations of the rankings illustrate that they do shift. The correlation in ranks from 1970 and 2002 is 0.64. Among the highest two ranks (as of 2002), the correlation is 0.55. Thus, there is movement in the rankings for all levels of colleges, and it is greater among the best.

Table 1 illustrates how the ranks change from 1970 to 2002. Most changes are increases³. Among

²Two states passed laws in 1991 and 1992. Six passed laws in 1993, three in 1994, eight in 1995, seven in 1996, four in 1997, five in 1998, two in 1999, one in 2001, two in 2002, and one in 2003 (Center for Education Reform 2010).

³One could argue that competitiveness changes over time are simply due to increases in the demand for higher education and do not actually reflect increases in university quality; however, the Barron's rankings are based on a stringent set of

all universities, nearly 37% have increased in ranking between 1970 and 2002, while 19% have decreased. Roughly 44% did not change over time.

Among universities ranked in the top three tiers in 2002, 70% have increased in rank since 1970 while roughly four percent decreased. Among the top two ranks, 70% increased compared to three percent that decreased. Increases are not surprising for schools achieving ranks in the top categories in 2002, but the number of tiers jumped indicates that at least 44 universities in the top two tiers in 2002 were not in this group in 1970. These universities, and thus their earlier graduates, may be incorrectly classified both using a reference year and in aggregated groupings due to their large movements.

Columns 7 and 8 in Table 1 illustrate what happened to the top universities in 1970. Among the top three tiers, 33% of universities increased in rank while 24% decreased, and 42% remained the same. For the top two tiers, nearly 39% increased, and roughly 19% decreased. The findings suggest that some top ranked universities may have jumped aggregated groupings.

Table 1 demonstrates that college rankings are dynamic. Using a reference year may lead to erroneous inferences. Furthermore, the number of tiers that colleges may change over time suggests that aggregating the quality measures will not solve the misclassification problem. These findings support the idea of tracing college rank back to when the teacher entered college.

4 Teacher Quality

The SASS is administered every four years and is a stratified probability proportional to size sample of school teachers across the United States designed to be representative of the nation. It is composed of a series of questionnaires, including school and teacher questionnaires. The teacher survey contains information on teacher demographics (e.g., age, race, sex) and education, including the name of his undergraduate institution and its IPEDS code, his majors, degrees obtained, and his graduation years.

The IPEDS code matches the SASS teachers and the college rank dataset. Teacher "matched ranking" is the Barron's ranking of the teacher's college published in the year of or the year subsequent to his enrollment. For example, a teacher who entered college in 1983 or in 1984 received the 1984 rank, while one who entered college in 1985 or in 1986 received the 1986 ranking. The matched rankings represent the college-based teacher quality measure. This paper excluded teachers who entered college in a year whose ranks were not included in the ranking dataset.

In the 2007-2008 SASS, 18,100⁴ teachers match with their institution's ranking when the teacher entered characteristics that remains stable over time. Thus, school quality may be increasing as schools are able to accept a lower percentage of applicants with higher test scores, class ranks, and GPAs.

⁴For confidentiality, all sample sizes are rounded to the nearest 10.

college. Of these, 17,290 were full or part time regular teachers⁵. Only the 14,030 teachers who attended college in a state with charter laws as of 2007 are included in the primary analysis. Teachers prefer to teach close to where they grew up or to where they went to college (Boyd et al. 2003, 2005). As such, this paper assumes teachers who were educated in non-charter states do not perceive themselves to face the same choice as teachers who were not. It assumes that the cost of finding a charter job is different for these teachers than for those educated in charter states⁶.

To highlight the importance of the matched ranking measure, this study also uses a reference year teacher quality measure to illustrate differences in the two measures. The 2002 ranks are the reference year ranking. This year was chosen as it corresponds to the teachers who most recently attended college (e.g., teachers who graduated from college in 2006 entered in 2002, and those who graduated in 2007 entered in 2003), allowing for the largest matched sample of teachers post charter introduction.

Table 2 presents the frequencies of college rankings in different subgroups of teachers, using both the matched ranking and the 2002 ranking. It illustrates how the two methods of assigning ranks result in different distributions of college-based quality. The differences grow as the reference year is further from the true entrance year. Table 2 also shows how the frequencies differ between public and charter teachers.

The 2002 ranks overstate the number of teachers from better colleges for both public and charter teachers. This is expected, given the upward trend in ranks over time. The discrepancies are even more pronounced as the teacher’s actual college entrance year is further from the reference year. Among teachers who entered college prior to 1980, the matched ranking measure finds 0.8% of traditional teachers hail from Most Competitive colleges and 2.5% from Highly Competitive colleges. The 2002 measure classifies 2.5% of these same teachers from Most Competitive and 8.3% from Highly Competitive colleges. The matched ranking finds roughly 11% of teachers are from Very Competitive colleges compared to 18% using the 2002 ranking.

For charter teachers entering college between 1980-1989, the matched ranking indicates that none are in the top two tiers, while the 2002 ranking indicates there are a few, though the small number rounds to zero. For traditional teachers, the matched ranking classifies 3.6% in the top two, compared to 7.7% using the 2002 ranking. The discrepancies illustrate that volatility in competitiveness is translated to the teacher population. The reference year rankings are distorting, and results based on this measure are likely to be biased.

Table 2 also illuminates how few teachers are from the top colleges, which is consistent with Hoxby’s 2002 findings. The matched ranking indicates 6.1% of all teachers are in the top two tiers. For teachers entering college before 1980, no charter teachers hail from Most Competitive colleges while 10 (0.8%) traditional

⁵This paper excluded long- and short-term substitutes and teacher aides from the analysis.

⁶All analyses have been carried out using all states, including charter and non-charter states, as well as using only teachers teaching in charter states. The general results hold for all analyses.

teachers do. For those entering in the 1980s, none of the 60 charter teachers are in the top two tiers, while 80 of the 2,210 traditional teachers are. The percentage of teachers in these ranks is increasing over time for both groups.

Table 3 expands on Table 2 by illustrating how many categories a teacher’s college rank differs between the two assignment methods for different subgroups. While roughly 61% of all teachers are ranked the same, nearly 25% of public teachers are ranked higher using the 2002 ranking than the matched ranking. Roughly 17% are ranked lower in 2002. Among charter teachers, 22% are ranked higher, and 13% are ranked lower.

Table 3 also reiterates how using a reference year is more distorting the further away it is from the actual entrance year. For those who entered college after 1999, 94% of charter and 89% of public teachers are ranked the same between the two methods. For those entering in the 1990s, only 59% and 57% of charter and public teachers are. This percentage drops to 50% and 48% for charter and public teachers entering in the 1980s. For those entering before 1980, 50% of charter teachers have the same ranking while 46% of public teachers do.

The evidence presented illustrates that college ranks change over time, and these changes are reflected in the teacher population. There is a difference in rankings between public and charter school teachers, and this difference appears greater the older the teacher. Older teachers from better colleges are traditional school teachers, while there is a greater percentage of Most and Highly Competitive alumni in charters versus public schools among the younger teachers. Since teacher quality is based on college ranks, teacher quality distributions differ depending upon how the rankings are assigned to the teacher. The greater the difference in the reference year and when the teacher actually entered college, the greater the misrepresentation. Furthermore, the misrepresentation differs for charter and public teachers.

These results suggest that teacher quality should be measured by the rank of their undergraduate college at the time of their enrollment in order to avoid the mismeasurement biases which might arise if ranks are assigned from a single reference year. The analysis below pursues this suggestion and quantifies the extent of these biases.

5 Teacher Perceptions of Charter & Public Schools

Proponents of charter schools claim that teachers choose charters because they can avoid the bureaucracy associated with traditional schools. Charters are also attractive as they focus on student needs and outcomes (Center for Education Reform 2010). Dye and Antle (1984) suggest that if productivity is correlated with preferences for nonpecuniary job aspects, then different types of workers might systematically sort across jobs, even in the absence of a monetary productivity premium. Accordingly, different quality teachers

may be attracted to different school types due to associated nonpecuniary attributes. For charters, these attributes may include a shorter schedule, fewer hours, or more autonomy in the classroom. Teachers sort and workplace characteristics matter, with higher quality teachers less likely to teach at urban (Ehrenberg and Brewer 1994, Figlio 2002, Figlio 1997) or poorer schools (Bacolod 2007b, Lankford et al. 2002). Charter or public school bundles also may enter into preferences.

The SASS contains questions on school characteristics, teacher pay, and teachers' perspectives of their school. The mean values of the responses for charter and public teachers are presented in Tables 4 and 6. The tables also indicate if the differences in the responses are significant.

Table 4 details summary statistics on basic workplace characteristics. On average, charter teachers report having longer contracts than public school teachers. They have more required hours and teaching hours per week. Charter teachers are significantly less likely to be in a union. They also earn significantly less money, on average, than traditional teachers. Since pay can vary with experience, teacher reported average pay by tenure is presented in Table 5.

The top half of Table 5 reports base pay and actual earnings by total experience. Charter teachers' average base pay is significantly lower than public teachers' for all except for those with 1-3, 10-14, 20-24, or over 30 years of experience. Average total earnings are significantly less for charter teachers, though the significance varies for those with over 20 years of experience.

The bottom half of Table 5 reports base pay and annual earnings based on tenure at the teachers' current schools. For their first 9 years of experience, charter teachers' base pay is significantly lower than public school teachers' base pay. For teachers with 10 or more years of tenure at a school, the significance disappears. For the most tenured, charter teachers report slightly higher pay, though the difference is insignificant. The trends are similar for total earnings.

If charter schools are to attract higher quality teachers despite lower salaries and longer school days and years, then other aspects of charter school employment must be more attractive than in traditional schools. The SASS contains questions regarding how much control teachers believe they have on certain aspects of their teaching. Answers range from 1-4, with a value of 1 corresponding to "No control" and 4 corresponding to "A great deal of control". Table 6 presents the mean responses for charter and public school teachers and indicates if any differences are significant.

The top portion of Table 6 suggests that on average, charter teachers rate their control over selecting instructional materials and course content higher than public school teachers. They rate their control over determining the amount of homework lower than their public school counterparts.

The SASS also contains questions regarding teacher perceptions. Answers range from 1-4, with a value of 1 corresponding to "Strongly agree" and 4 corresponding to "Strongly disagree". In the bottom of Table

6, a negative (positive) difference means the charter teachers agree (disagree) more with the statement than public school teachers.

Responses indicate that while charter teachers are less satisfied with their salaries than public teachers, they are not more likely to leave for greater pay. They are less satisfied with teaching at the school and do not believe their peers are happy. They worry more about job security due to student performance. They believe the school is not run well, and they report lower satisfaction with the adequacy of teaching materials and support for disabled students than public teachers.

Compared to public school teachers, charter teachers believe that their peers are more likely to enforce school rules. They report that their principals communicate goals more, and they believe the staff is more cooperative. Charter teachers report that other duties and paperwork do not interfere with their teaching. Finally, they report having maintained enthusiasm at a greater rate.

Thus, while charter teachers are paid less, are less satisfied with their schools and more worried about their jobs than public teachers, they are still maintaining their enthusiasm. The support from staff, communication from the principals, and lack of extraneous duties support the suggestion that teachers may be attracted to charters because of nonpecuniary attributes. This paper next investigates whether these preferences are related to quality.

6 Methods

While the process through which a teacher and school choose one another is two-sided, the SASS allows only the observation of the result of the matching process. Baker and Dickerson (2006) use 1999-2000 SASS data and assume that the school determines the match when investigating teacher quality in public, private, and charter schools. They find charters had a larger share of higher quality teachers than public schools. The estimation equation considers college competitiveness the dependent variable and school type an independent variable.

Carruthers (2009) examines North Carolina teachers who switch schools. She finds teachers moving from public to charter schools are less qualified and less likely to have graduated from a competitive college than other movers. She finds that charters do not skim high quality teachers from public schools, though they draw more effective teachers among those switching schools. Like Baker and Dickerson, Carruthers also considers college competitiveness the dependent variable and school type an independent variable.

In both studies, the estimation equation assumes that a future event, school type, predicts a past event, college competitiveness. They suggest where a teacher currently teaches predicts her quality, when in fact, different quality teachers may self-select into the different school types. These studies reverse the causality

of the relationship.

This paper takes a different viewpoint and investigates how teacher characteristics, in particular, teacher quality influences and predicts the matching result. Assuming a teacher knows his own skill set, a teacher also knows which school would be suitable for his needs and desires in a workplace. Teachers decide where to apply and how to sort. A high quality teacher may like the autonomy at charter schools, while a lower quality teacher may desire more stringent guidelines and the union protection available at public schools. Teachers are the most informed about their own abilities, desires, and beliefs, and ultimately they decide which position to accept, among those offered.

This study assumes that the highest quality teachers can choose their ideal schools⁷. Schools want to hire the best, and there are not enough top quality teachers to fill all positions. Estimates for the highest quality teachers from Most Competitive colleges represent their preferences of school type. The next highest quality teachers, those from Highly Competitive colleges, will also be able to choose their optimal schools, given the position is still available and has not been filled by the highest quality teacher. The interpretation of the coefficient for these teachers represents a mixture of preferences and availability. As quality declines, the interpretation represents availability more than preferences, as lower quality teachers will not be able to choose freely between school types. These teachers will be offered what has not been accepted by the higher quality teachers.

The basic model in this paper is represented by the following equation:

$$Charter_i = \alpha_0 + Q'_i\beta + S'_i\delta + X'_i\gamma + \varepsilon \quad (1)$$

The dependent variable, *Charter*, is an indicator variable equal to one if teacher *i* teaches at a charter school during the 2007-2008 academic year and is equal to zero if the teacher teaches at a public school. Since the dependent variable is binary, the model is estimated via a probit regression. For each probit, the marginal effects are calculated for a benchmark teacher. The benchmark teacher is a White male of the lowest quality with no graduate degrees, with the average number of years of experience, and who is of the average age for the sample of interest.

The teacher quality measures are contained in the *Q* vector. To determine if aggregating quality could mask effects of finer distinctions of quality, this paper estimates the equation using two specifications of the *Q* vector. The first aggregates quality, creating three quality groups. Higher Quality is a dummy variable equal to one if teachers hail from Most or Highly Competitive colleges. Lower Quality is a dummy

⁷Though charter schools are not uniformly distributed across charter states, it is also assumed that teachers are able to relocate to accept employment at a charter if desired.

variable equal to one if teachers are from Very Competitive, Competitive, or Less Competitive colleges. Non Competitive teachers comprise the final group. In the second specification, each ranking is included as a binary variable. This specification is of the most interest, as it clearly illustrates what the effects are for differing levels of quality and indicates if there is a stronger effect for better quality teachers. This paper estimated both specifications using the matched and the 2002 ranking to investigate how a reference year might distort findings.

For all specifications, S_i is a vector of educational attainment variables, including if teacher i obtained either a Master's degree or a Ph.D.⁸. Finally, X_i is a vector of demographic controls, including teacher i 's years of teaching experience, age, gender, and ethnicity.

7 Regression Results

7.1 2007-2008 SASS Findings

The results of the probit model for the aggregated quality regression are presented in Table 7. Column 1 presents the estimates using the matched ranking. Column 2 presents the results for the matched population using the 2002 ranking, while Column 3 estimates the equation for all teachers using the 2002 ranking, including those who do not have a matched ranking measure⁹.

The estimates affirm the model is plausible as the coefficients all exhibit the expected signs. With respect to controls, the negative and significant coefficient on Master's degree corresponds to the idea that charter teachers have little incentive to obtain an advanced degree compared to public teachers, who are often required by law to get one while the charter teachers are exempt. The table also indicates that more experienced teachers are less likely to work at a charter, holding constant quality. Since charter schools are a relatively recent development, this result is not surprising. A veteran teacher with job security, who has already established her reputation and learned the ins and outs of her school will have little incentive to leave.

The positive and significant coefficients on Hispanic, Black, and Asian are unsurprising as charters disproportionately enroll minority students (Frankenberg et al. 2010, Hoxby and Muraka 2009). Given that students learn better from teachers with the same ethnicity (Dee 2004), a teacher who wishes to be the most effective will choose to teach where she shares the ethnicity of the students.

⁸All teachers have their undergraduate degrees in the analysis, so the comparison is to teachers without any graduate degree.

⁹Teachers without a matched measure are teachers who entered college in a year for which the Barron's rankings are not included in this study.

The quality estimates imply that Higher Quality teachers are significantly more likely to work at a charter than their lowest quality counterparts. There is no effect for Lower Quality teachers.

Comparing the results in Column 1 to those in Column 2 to determine if the difference in assigning ranks matters, the reference year produces a lower point estimate with a lower significance on the quality variables than the matched measure¹⁰. The discrepancies worsen in Column 3, which incorporates all teachers, including those without a matched ranking. The additional teachers entered college before 1991, further from the reference year. The results represent what other studies using a reference year would have found. The estimate for Higher Quality teachers is less than half of the previous estimates and is insignificant. The studies would have erroneously concluded there was no quality effect, while the matched ranking indicates that there is one.

Table 8 reports the marginal effects of the probit presented in Table 7. For this population, the benchmark teacher is 36.3 years of age with 9.6 years of teaching experience. The probability of teaching at a charter for this population is 4.6%.

The first column indicates that teachers with Master's degrees are roughly one percentage point (22%) less likely to work at a charter. For each decade of teaching experience a teacher has, he is roughly 1.8 percentage points, or 39%, less likely to work at a charter school. Column 1 also finds that females are nearly 22% more likely to work at a charter school than males.

The biggest effect appears to be with respect to a teacher's race. Black teachers are 4.9 percentage points, or 107%, more likely to work at a charter than a White teacher. Hispanic teachers are 2.1 percentage points (46%) more likely, and Asian teachers are 3.1 percentage points (67%) more likely to work at a charter than the White benchmark teacher.

Quantifying the quality effect, the Column 1 finds Higher Quality teachers from Most and Highly Competitive colleges are 2.1 percentage points, or 46%, more likely to work at a charter school than the lowest quality benchmark teacher from a Non Competitive college. Lower Quality teachers are not significantly more likely to work at a charter school than the lowest quality benchmark.

The quality effect does not appear that large compared to other controls. While it is larger in magnitude than the effects of graduate degrees, gender, or years of experience, it is less than half the effect of being Black. The small magnitude of the quality effect may be reflecting the fact that teachers were aggregated into quality groups, something that will be investigated in Table 9.

For the reference year marginal effects, Column 2 indicates that Higher Quality teachers are 1.8 percentage points (39%) more likely to teach at a charter school than the benchmark teacher. There is still no effect

¹⁰The analyses were also carried out using the 2000 ranks as the reference year for columns 2 and 3, and the results and conclusions hold.

for Lower Quality teachers. Again, incorporating all teachers in Column 3, the estimate is less than half of that in Column 2 and is insignificant.

While the previous tables illustrate that there is a quality effect, the question remains if finer distinctions of quality matter. Table 9 presents the marginal effects for the disaggregated quality estimation. The columns can be interpreted in the same manner as those of Tables 7 and 8.

Table 9 indicates that the aggregated quality analysis fails to pick up differences among the finer quality distinctions. Column 1 suggests that teachers from the Most Competitive colleges are 4.4 percentage points, or 96%, more likely to teach at a charter than those from Non Competitive colleges. This estimate reflects the fact that schools desire better teachers, and these teachers are able to choose their ideal school. Thus, the 4.4 percentage point increase reflects these teachers' preferences for charters over traditional schools.

Highly and Very Competitive college graduates are 1.7 and 1.9 percentage points, or 37% and 41%, more likely to work at a charter than the benchmark teacher. These estimates are a combination of the teachers preferences for charter positions given their availability. As quality declines, the point estimates decline as well, and teachers from Competitive and Less Competitive colleges are not significantly more likely to work at a charter. The insignificant result may reflect the fact that these teachers were not able to choose a charter school, as the positions may have been filled. As such, for these teachers, the estimate reflects availability more than preferences.

Table 9 also indicates that using the 2002 ranking continues to produce distorted estimates. The difference is greatest between the two measurements for teachers from Most and Very Competitive colleges. In Column 2, the reference year ranking indicates the Most Competitive graduates are 4.0 percentage points more likely to work at a charter, while Highly Competitive graduates no longer have a quality effect. Teachers from Very Competitive colleges are 1.6 percentage points more likely, while there is no quality effect for teachers from lower ranked schools.

The results suggest the probability of teaching at a charter over a public school generally increases as quality increases. Aggregating quality leads to inaccurate conclusions. Using a reference year is more misleading at the highest quality level, and it may change the significance of the findings.

Thus far, more experienced teachers appear less likely to choose a charter over a public school. Charters may have been perceived as risky ventures or as negative signals when they were first introduced. As such, the attraction to charter schools and the quality effect may be different among different cohorts of teachers depending upon when they started teaching. Table 10 presents the marginal effects of the probit regressions for different cohorts to determine if the quality effect varies between them. A cohort is defined as the group of teachers matched to a Barron's publication year. For example, teachers who entered college in 1991 and 1992 are classified in the 1992 cohort. There are nine cohorts corresponding to the nine years of Barron's

rankings in this study.

The matched ranking is the sole quality measure in the cohort analysis. Due to the small number of charter teachers in each cohort, this study combines some independent variables because of lack of variation. For example, it combines having a Master's or a Ph.D. into a dummy variable for graduate degrees which is equal to one if the teacher has either an M.A. or a Ph.D. For the 1969-1970 and 1993-1994 cohorts, it combines teachers from Most and Highly Competitive colleges due to a lack of variation in these categories for charter and traditional teachers. For other cohorts, such as 1983-1984 and 1985-1986, it combines teachers from Most, Highly, and Very Competitive colleges. When necessary, this study combines minority groups as "Other Ethnicity" due to the small number of minorities in certain cohorts.

The marginal effects for each cohort presented in Table 10 are in reference to a benchmark teacher for that cohort¹¹. All coefficients on the controls exhibit the expected sign. The quality effect is absent for older teachers, as expected, since these teachers would have already found their ideal school by the time charters were established. The quality effect first appears in 1997, though there is a slight negative effect for teachers from Very Competitive colleges who entered in 1995-1996.

The quality effect is largest for the highest quality and most recent college graduates. Among those who entered college in 2001-2002 and who graduated in 2005-2006, the probability of teaching at a charter is 6.4%. For these teachers, those from Most Competitive colleges are 11.5 percentage points, or 177% (11.5/6.4), more likely to teach at a charter than their benchmark teacher.

For those who entered college in 1999-2000, the probability of teaching at a charter is 7.0%. Those from Most Competitive colleges are 11.1 percentage points, or 159% more likely to teach at a charter, compared to their benchmark. Highly Competitive and Very Competitive college graduates are 6.1 (87%) and 3.8 (54%) percentage points more likely to teach at a charter.

For those entering in 1997-1998, the probability of teaching at a charter is 5.3%. Teachers from Highly Competitive colleges are 8.9 percentage points more likely to teach at a charter than their benchmark. Those from Very Competitive and Competitive colleges are 6.7 and 2.3 percentage points more likely.

The results from these three cohorts imply that the quality effect on charter school preferences is stronger in more recent cohorts. In particular, for the two most recent cohorts, teachers from the best colleges have the largest increase in the probability of teaching a charter school. These results are important because if the highest quality teachers in the youngest cohorts are significantly more likely to prefer a charter school, this must be affecting the quality level of public school teachers. Furthermore, as older teachers retire, the quality effect on public schools can become even larger.

¹¹ Recall the benchmark teacher is a White male of the lowest quality and of average age with the average number of years of experience for that particular cohort.

7.2 Persistence: 2003-2004 SASS Findings

While the SASS does not follow the same teachers across waves, it is designed to be representative. As such, data from the 2003-2004 SASS along with data from the 2007-2008 SASS allow this study to observe many of the same cohorts at two different points in time. The most recent cohort in the later data is not in the 2003-2004 data, as these teachers were just entering college at that time. A cohort analysis¹² applied to the earlier data explores if the patterns observed in the most recent data persist. This analysis implements the same methodology to identify the matched rankings. The sample of regular teachers educated in charter states who have a matched ranking is 13,340.

The results for the cohort analysis using the earlier data are presented in Table 11. The marginal effects are calculated in comparison to a benchmark teacher for each cohort. This study combined quality measures and ethnicities for certain cohorts due to lack of variation in independent variables.

The estimates suggest that the quality effect is nonexistent for teachers who entered college prior to 1991, as was true for the cohort analysis using the 2007-2008 SASS data. For the 1991-1992 cohort, the magnitudes of the quality effect appears the same for both the 2003-2004 and the 2007-2008 analysis. Thus, for older cohorts, decisions appear to be persistent.

Interestingly, for teachers in the 1993-1994 and 1995-1996 cohorts who graduated between 1997-2000, the 2003-2004 data suggest there was a slight quality effect for Highly Competitive, Very Competitive, and Competitive college graduates. By 2007-2008, the effect seems to have disappeared (Table 10). The 1997-1998 cohort's decisions do appear similar in the two analyses, with the magnitudes of the quality effects similar in both datasets. The few observations in the latest cohort of the 2003-2004 data make comparisons across the analyses difficult, though it is apparent the magnitudes of the estimates are increasing with quality.

The estimates in Table 11 imply that for the majority of cohorts, the patterns appear to hold over time. The probability of teaching at a charter generally increases with college-based quality. The probabilities for higher quality teachers increase in magnitude the younger the cohort. These findings imply that as cohorts retire, the distribution of teacher quality in public schools may be increasingly skewed towards lower quality teachers as higher quality teachers choose charter schools.

8 Conclusions

This paper uses a disaggregated measure of teacher quality based on the competitiveness of a teacher's college as measured by *Barron's Profiles of American Colleges* to determine how different quality teachers

¹²The study replicated all previous analyses using the 2007-2008 data with the 2003-2004 data. The general results hold and are available upon request.

sort between public and charter schools. The findings reveal that teachers from better colleges are more likely to teach at a charter than at a public school. This probability increases with college competitiveness. The greatest impact is on the youngest and newest teachers, with the highest quality ones being roughly 11 percentage points more likely to teach at a charter over their lowest quality counterparts. Quality effects are nonexistent for older teachers. School choice patterns appear persistent over time given a subsequent analysis using the 2003-2004 SASS data, as the magnitudes of the quality effects for cohorts appear similar between the two datasets.

This paper further investigates how to most appropriately proxy for teacher quality using undergraduate college ranking. It finds that aggregating quality levels can mask effects of finer quality distinctions and lead to erroneous conclusions. Furthermore, since competitiveness and rankings are dynamic, this paper finds that using a single reference year to measure competitiveness can be misleading and distort results. The distortion consistently underestimates the differences in choosing a charter for each quality distinction. The distortion becomes more pronounced the further the reference year is from when teachers actually entered college.

Few teachers hail from the best institutions. Since teacher quality affects student outcomes, knowing where newer and better quality teachers' preferences lay may illuminate how to attract such teachers. Since these teachers are disproportionately choosing charter schools, public schools must address their shortcomings and ask why these teachers are choosing the charter bundle.

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Table 1. Frequencies of Differences in University Ranks from 1970 to 2002

| | All Universities | | Highly, Very High, or Most Competitive in 2002 | | Very High or Most Competitive in 2002 | | Highly, Very High, or Most Competitive in 1970 | | Very High or Most Competitive in 1970 | |
|-----------------------------|------------------|------|--|------|--|------|--|------|--|------|
| | N % | | N % | | N % | | N % | | N % | |
| | N | % | N | % | N | % | N | % | N | % |
| 3 Categories Lower in 2002 | 2 | 0.2 | 0 | 0.0 | 0 | 0.0 | 2 | 0.9 | 2 | 2.2 |
| 2 Categories Lower in 2002 | 25 | 2.2 | 0 | 0.0 | 0 | 0.0 | 9 | 3.9 | 1 | 1.1 |
| 1 Category Lower in 2002 | 198 | 17.0 | 14 | 3.7 | 5 | 3.3 | 46 | 19.7 | 14 | 15.4 |
| No Difference | 512 | 44.0 | 99 | 26.4 | 39 | 25.3 | 99 | 42.3 | 39 | 42.9 |
| 1 Category Higher | 337 | 29.0 | 188 | 50.1 | 66 | 42.9 | 66 | 28.2 | 35 | 38.5 |
| 2 Categories Higher in 2002 | 86 | 7.4 | 71 | 18.9 | 41 | 26.6 | 12 | 5.1 | 0 | 0.0 |
| 3 Categories Higher in 2002 | 3 | 0.3 | 3 | 0.8 | 3 | 2.0 | 0 | 0.0 | 0 | 0.0 |
| Total | 1,163 | 100 | 375 | 100 | 154 | 100 | 234 | 100 | 91 | 100 |

Table 2 Frequencies of College Competitiveness among Teachers in Matched Sample

| Teachers Entering College before 1980 | | | | | | | | |
|---|-----------------|------|-------------|------|--------------|------|-------------|------|
| | Matched Ranking | | | | 2002 Ranking | | | |
| | Charter | | Traditional | | Charter | | Traditional | |
| | N | % | N | % | N | % | N | % |
| Non Competitive | 0 | 0.0 | 40 | 3.3 | 0 | 0.0 | 30 | 2.5 |
| Less Competitive | 10 | 50.0 | 370 | 30.6 | 10 | 50.0 | 250 | 20.7 |
| Competitive | 10 | 50.0 | 640 | 52.9 | 10 | 50.0 | 590 | 48.8 |
| Very Competitive | 0 | 0.0 | 130 | 10.7 | 0 | 0.0 | 220 | 18.2 |
| Highly Competitive | 0 | 0.0 | 30 | 2.5 | 0 | 0.0 | 100 | 8.3 |
| Most Competitive | 0 | 0.0 | 10 | 0.8 | 0 | 0.0 | 30 | 2.5 |
| Total | 20 | 100 | 1,210 | 100 | 20 | 100 | 1,210 | 100 |
| Teachers Entering College between 1980-1989 | | | | | | | | |
| | Matched Ranking | | | | 2002 Ranking | | | |
| | Charter | | Traditional | | Charter | | Traditional | |
| | N | % | N | % | N | % | N | % |
| Non Competitive | 10 | 16.7 | 250 | 11.3 | 0 | 0.0 | 110 | 5.0 |
| Less Competitive | 10 | 16.7 | 550 | 24.9 | 10 | 16.7 | 450 | 20.4 |
| Competitive | 30 | 50.0 | 1050 | 47.5 | 30 | 50.0 | 1070 | 48.4 |
| Very Competitive | 10 | 16.7 | 280 | 12.7 | 20 | 33.3 | 410 | 18.6 |
| Highly Competitive | 0 | 0.0 | 60 | 2.7 | 0 | 0.0 | 120 | 5.4 |
| Most Competitive | 0 | 0.0 | 20 | 0.9 | 0 | 0.0 | 50 | 2.3 |
| Total | 60 | 100 | 2,210 | 100 | 60 | 100 | 2,210 | 100 |
| Teachers Entering College between 1990-1999 | | | | | | | | |
| | Matched Ranking | | | | 2002 Ranking | | | |
| | Charter | | Traditional | | Charter | | Traditional | |
| | N | % | N | % | N | % | N | % |
| Non Competitive | 30 | 7.69 | 640 | 8.7 | 20 | 5.1 | 400 | 5.4 |
| Less Competitive | 70 | 17.9 | 1320 | 17.9 | 70 | 17.9 | 1390 | 18.8 |
| Competitive | 160 | 41.0 | 3730 | 50.5 | 170 | 43.6 | 3690 | 49.9 |
| Very Competitive | 90 | 23.1 | 1220 | 16.5 | 90 | 23.1 | 1360 | 18.4 |
| Highly Competitive | 30 | 7.7 | 410 | 5.5 | 30 | 7.7 | 410 | 5.5 |
| Most Competitive | 10 | 2.6 | 80 | 1.1 | 20 | 5.1 | 140 | 1.9 |
| Total | 390 | 100 | 7,390 | 100 | 390 | 100 | 7,390 | 100 |
| Teachers Entering College between 2000-2002 | | | | | | | | |
| | Matched Ranking | | | | 2002 Ranking | | | |
| | Charter | | Traditional | | Charter | | Traditional | |
| | N | % | N | % | N | % | N | % |
| Non Competitive | 10 | 5.9 | 170 | 6.6 | 10 | 5.9 | 140 | 5.4 |
| Less Competitive | 20 | 11.8 | 480 | 18.7 | 20 | 11.8 | 460 | 17.9 |
| Competitive | 80 | 47.1 | 1260 | 49.0 | 80 | 47.1 | 1320 | 51.4 |
| Very Competitive | 40 | 23.5 | 470 | 18.3 | 40 | 23.5 | 450 | 17.5 |
| Highly Competitive | 10 | 5.9 | 150 | 5.8 | 10 | 5.9 | 150 | 5.8 |
| Most Competitive | 10 | 5.9 | 40 | 1.6 | 10 | 5.9 | 40 | 1.6 |
| Total | 170 | 100 | 2,570 | 100 | 170 | 100 | 2,570 | 100 |

Note: Teachers are regular full- or part-time teachers educated in charter states only. Sample sizes rounded to nearest 10 for confidentiality purposes. Samples may not add up due to rounding.

Table 3 Frequencies of Differences in Rankings between the Matched Rankings & 2002 Rankings

| | 2000s College Entrants | | | | 1990-1999 College Entrants | | | |
|-----------------------------|----------------------------|------|-----------------|------|----------------------------|------|-------------|------|
| | Charter | | Traditional | | Charter | | Traditional | |
| | N | % | N | % | N | % | N | % |
| 3 Categories Lower in 2002 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 2 Categories Lower in 2002 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 100 | 1.4 |
| 1 Category Lower in 2002 | 0 | 0.0 | 120 | 4.7 | 70 | 17.9 | 1240 | 16.8 |
| No Difference | 160 | 94.1 | 2280 | 88.7 | 230 | 59.0 | 4240 | 57.4 |
| 1 Category Higher in 2002 | 10 | 5.9 | 150 | 5.8 | 80 | 20.5 | 1500 | 20.3 |
| 2 Categories Higher in 2002 | 0 | 0.0 | 20 ^a | 0.8 | 10 | 2.6 | 280 | 3.8 |
| 3 Categories Higher in 2002 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 30 | 0.4 |
| Total | 170 | 100 | 2,570 | 100 | 390 | 100 | 7,390 | 100 |
| | 1980-1989 College Entrants | | | | pre-1980 College Entrants | | | |
| | Charter | | Traditional | | Charter | | Traditional | |
| | N | % | N | % | N | % | N | % |
| 3 Categories Lower in 2002 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 2 Categories Lower in 2002 | 0 | 0.0 | 20 | 0.9 | 0 | 0.0 | 20 | 1.7 |
| 1 Category Lower in 2002 | 10 | 16.7 | 300 | 13.6 | 0 | 0.0 | 170 | 14.0 |
| No Difference | 30 | 50.0 | 1050 | 47.5 | 10 | 50.0 | 550 | 45.5 |
| 1 Category Higher in 2002 | 20 | 33.3 | 670 | 30.3 | 10 | 50.0 | 350 | 28.9 |
| 2 Categories Higher in 2002 | 10 | 16.7 | 170 | 7.7 | 0 | 0.0 | 130 | 10.7 |
| 3 Categories Higher in 2002 | 0 | 0.0 | 10 | 0.5 | 0 | 0.0 | 10 | 0.8 |
| Total | 60 | 100 | 2,210 | 100 | 20 | 100 | 1,210 | 100 |

Note: Sample sizes rounded to nearest 10 for confidentiality purposes. Columns may not add up due to rounding.

^a Estimate refers to 2 or 3 categories higher in 2002

Table 4. Differences between Charter and Public School Teachers Workplace Characteristics

| | Charter Mean | n | Public Mean | n | Difference | t-stat | N |
|-------------------------------------|--------------|-----|-------------|-------|------------|--------|-------|
| School Characteristics | | | | | | | |
| Contract Days | 199 | 640 | 189 | 13390 | 10 | 8.92 | 14030 |
| Hours per Week Required | 39.1 | 640 | 37.9 | 13390 | 1.2 | 6.39 | 14030 |
| Hours of Teaching per Week Required | 30.6 | 640 | 29.6 | 13390 | 1.0 | 4.25 | 14030 |
| Union Status (=1) | 0.26 | 640 | 0.71 | 13390 | -0.45 | -1.83 | 14030 |
| Pay Base | \$38,379 | 640 | \$42,913 | 13390 | -\$4,534 | -9.43 | 14030 |
| Annual Earnings | \$39,989 | 640 | \$45,235 | 13390 | -\$5,246 | -10.32 | 14030 |

Note: Sample sizes rounded to nearest 10 for confidentiality purposes.

Table 5. Differences between Charter and Public School Base & Total Pay

| | Base Pay | | | | | | |
|--------------------------------|--------------|-----|-------------|-------|------------|--------|-------|
| | Charter Mean | n | Public Mean | n | Difference | t-stat | N |
| Years of Experience | | | | | | | |
| 1-3 years | \$36,009 | 270 | \$36,228 | 3520 | -\$220 | -0.45 | 3790 |
| 4-5 years | \$37,105 | 140 | \$39,178 | 2020 | -\$2,073 | -2.80 | 2150 |
| 6-9 years | \$40,284 | 150 | \$42,662 | 3360 | -\$2,379 | -2.85 | 3510 |
| 10-14 years | \$43,814 | 50 | \$46,263 | 2063 | -\$2,449 | -1.37 | 2110 |
| 15-19 years | \$42,449 | 20 | \$51,542 | 1190 | -\$9,093 | -3.18 | 1220 |
| 20-24 years | \$44,976 | 10 | \$52,652 | 450 | -\$7,677 | -1.55 | 460 |
| 25-30 years | \$38,768 | 10 | \$53,835 | 180 | -\$15,067 | -2.17 | 190 |
| 30 plus years | \$55,784 | 10 | \$56,668 | 610 | -\$884 | -0.17 | 620 |
| All | \$38,379 | 640 | \$42,913 | 13390 | -\$4,534 | -9.43 | 14030 |
| Total Earnings | | | | | | | |
| 1-3 years | \$37,412 | 270 | \$38,276 | 2050 | -\$864 | -1.65 | 3790 |
| 4-5 years | \$38,829 | 140 | \$41,570 | 1890 | -\$2,741 | -3.30 | 2150 |
| 6-9 years | \$41,984 | 150 | \$45,036 | 3330 | -\$3,052 | -3.36 | 3510 |
| 10-14 years | \$45,413 | 50 | \$48,853 | 2240 | -\$3,441 | -1.84 | 2110 |
| 15-19 years | \$44,969 | 20 | \$53,926 | 1220 | -\$8,956 | -2.98 | 1220 |
| 20-24 years | \$47,084 | 10 | \$54,888 | 240 | -\$7,804 | -1.52 | 460 |
| 25-30 years | \$41,208 | 10 | \$56,307 | 80 | -\$15,099 | -2.05 | 190 |
| 30 plus years | \$57,192 | 10 | \$59,057 | 900 | -\$1,864 | -0.34 | 620 |
| All | \$39,989 | 640 | \$45,235 | 13390 | -\$5,246 | -10.32 | 14030 |
| Years at Current School | | | | | | | |
| Base Pay | | | | | | | |
| 1-3 years | \$37,304 | 450 | \$39,072 | 6340 | -\$1,768 | -3.75 | 6790 |
| 4-5 years | \$37,965 | 100 | \$41,842 | 2110 | -\$3,876 | -3.85 | 2220 |
| 6-9 years | \$42,062 | 70 | \$45,437 | 2590 | -\$3,376 | -2.40 | 2660 |
| 10-14 years | \$48,472 | 10 | \$48,898 | 1190 | -\$427 | -0.11 | 1210 |
| 15-19 years | \$59,030 | 0 | \$52,573 | 600 | \$6,457 | 0.79 | 610 |
| Total Earnings | | | | | | | |
| 1-3 years | \$38,734 | 450 | \$41,214 | 6340 | -\$2,480 | -4.95 | 6790 |
| 4-5 years | \$40,065 | 100 | \$44,278 | 2110 | -\$4,214 | -3.86 | 2220 |
| 6-9 years | \$43,913 | 70 | \$47,938 | 2590 | -\$4,025 | -2.68 | 2660 |
| 10-14 years | \$50,288 | 10 | \$51,475 | 1190 | -\$1,187 | -0.30 | 1210 |
| 15-19 years | \$64,662 | 0 | \$54,864 | 600 | \$9,798 | 1.15 | 610 |

Note: Sample sizes rounded to nearest 10 for confidentiality purposes. Columns and rows may not add up due to rounding.

Table 6. Differences between Charter and Public School Teachers' Beliefs about Workplace Characteristics

| | Charter | | Public | | Difference | t-stat | N |
|--|---------|-----|--------|-------|------------|--------|-------|
| | Mean | n | Mean | n | | | |
| Has Control Over ^a : | | | | | | | |
| Selecting Instructional Materials | 2.90 | 640 | 2.75 | 13390 | 0.04 | 3.40 | 14030 |
| Selecting Course Content | 3.00 | 640 | 2.80 | 13390 | 0.04 | 4.87 | 14030 |
| Selecting Teaching Techniques | 3.69 | 640 | 3.70 | 13390 | 0.02 | -0.33 | 14030 |
| Evaluating and Grading Students | 3.63 | 640 | 3.62 | 13390 | 0.03 | 0.32 | 14030 |
| Disciplining Students | 3.46 | 640 | 3.46 | 13390 | 0.03 | 0.29 | 14030 |
| Determining Amount of Homework | 3.60 | 640 | 3.73 | 13390 | 0.02 | -5.43 | 14030 |
| Agreement ^b : | | | | | | | |
| Satisfied Salary | 2.72 | 640 | 2.63 | 13390 | 0.09 | 2.24 | 14030 |
| Would Leave for More Pay if Possible | 3.03 | 640 | 3.05 | 13390 | -0.02 | -0.58 | 14030 |
| Satisfied with Teaching at School | 1.62 | 640 | 1.54 | 13390 | 0.09 | 3.14 | 14030 |
| Teachers at School are Happy | 2.05 | 640 | 1.96 | 13390 | 0.09 | 2.73 | 14030 |
| School is Run Well | 2.12 | 640 | 2.00 | 13390 | 0.12 | 3.60 | 14030 |
| Not Worth Teaching at Current School | 3.22 | 640 | 3.25 | 13390 | -0.03 | -0.86 | 14030 |
| Wants to Transfer to Another School | 2.83 | 640 | 3.04 | 13390 | -0.21 | -5.13 | 14030 |
| Worried about Job Security due to Student Test Performance | 2.91 | 640 | 2.99 | 13390 | -0.08 | -2.12 | 14030 |
| Administration Supportive | 1.62 | 640 | 1.62 | 13390 | 0.01 | 0.16 | 14030 |
| Parents Supportive | 2.36 | 640 | 2.39 | 13390 | -0.02 | -0.68 | 14030 |
| Principal Enforces School Rules & Supports Teachers | 1.63 | 640 | 1.63 | 13390 | 0.01 | 0.24 | 14030 |
| Teachers Enforce School Rules | 2.15 | 640 | 2.25 | 13390 | -0.10 | -2.77 | 14030 |
| Teachers Share Beliefs about School Mission | 1.82 | 640 | 1.86 | 13390 | -0.03 | -1.16 | 14030 |
| Principal Communicates School Goals to Teachers | 1.57 | 640 | 1.63 | 13390 | -0.06 | -1.85 | 14030 |
| Adequate Support for Teaching Special Needs Students | 2.32 | 640 | 2.22 | 13390 | 0.09 | 2.67 | 14030 |
| Materials (texts, supplies) Adequate | 1.90 | 640 | 1.81 | 13390 | 0.09 | 2.71 | 14030 |
| Duties/Paperwork Interfering | 2.46 | 640 | 2.17 | 13390 | 0.29 | 7.80 | 14030 |
| Staff is Cooperative | 1.76 | 640 | 1.86 | 13390 | -0.10 | -3.10 | 14030 |
| Staff Recognized for Good Work | 1.97 | 640 | 2.00 | 13390 | -0.03 | -0.82 | 14030 |
| Less Enthusiastic than when Started | 2.97 | 640 | 2.90 | 13390 | 0.07 | 1.72 | 14030 |

^a Teacher reported degree of control (1=No control, 2=Minor control, 3=Moderate control, 4=A great deal of control)

^b Teacher reported degree of agreement (1=Strongly Agree, 2=Somewhat Agree, 3=Somewhat disagree, 4=Strongly disagree)

Note: Sample sizes rounded to nearest 10 for confidentiality purposes.

Table 7. Probit Results of Charter School Participation & Teacher Quality, 2007-2008 Regular Teachers, Aggregated Quality

| | Matched Quality | 2002 Ranks | |
|--|------------------------|------------------------|------------------------|
| | | Matched Sample | All FT/PT Teachers |
| Higher Quality (=1) | 0.2679*** (0.0962) | 0.2312** (0.0948) | 0.1012 (0.0709) |
| Lower Quality (=1) | 0.0831 (0.0726) | 0.0344 (0.0891) | -0.0477 (0.0662) |
| Master's Degree (=1) | -0.1529*** (0.0407) | -0.1576*** (0.0408) | -0.1540*** (0.0314) |
| PhD (=1) | -0.1688 (0.3389) | -0.1788 (0.3356) | 0.2001 (0.1420) |
| Years of Teaching Experience (decades) | -0.2963*** (0.0483) | -0.3024*** (0.0487) | -0.2833*** (0.0257) |
| Female (=1) | 0.1311*** (0.0428) | 0.1336*** (0.0429) | 0.0701** (0.0332) |
| Age (100s yrs) | -0.0461 (0.2607) | -0.0259 (0.2612) | 0.2252 (0.1777) |
| Hispanic (=1) | 0.2610*** (0.0725) | 0.2662*** (0.0726) | 0.3023*** (0.0597) |
| Black (=1) | 0.4982*** (0.0601) | 0.5112*** (0.0603) | 0.4376*** (0.0482) |
| Asian (=1) | 0.3526*** (0.1279) | 0.3429*** (0.1275) | 0.3818*** (0.1028) |
| Pacific Islander (=1) | 0.3498* (0.2116) | 0.3530* (0.2133) | 0.1645 (0.1963) |
| American Indian (=1) | -0.1011 (0.1273) | -0.0988 (0.1275) | -0.1520 (0.1050) |
| Constant | -1.6538*** (0.1121) | -1.6457*** (0.1250) | -1.6035*** (0.0905) |
| Observations | 14030 | 14030 | 26510 |

Sample sizes rounded to nearest ten for confidentiality purposes.

Reporting probit estimates

High quality refers to teachers from Most and Highly Competitive colleges

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Marginal Effects of Charter School Participation & Teacher Quality, 2007-2008 Regular Teachers, Aggregated Quality

| | Matched Quality | 2002 Ranks | |
|--|------------------------|------------------------|------------------------|
| | | Matched Sample | All FT/PT Teachers |
| Higher Quality (=1) | 0.0214*** (0.0081) | 0.0182*** (0.0067) | 0.0083 (0.0055) |
| Lower Quality (=1) | 0.0056 (0.0046) | 0.0022 (0.0056) | -0.0034 (0.0049) |
| Master's Degree (=1) | -0.0082*** (0.0024) | -0.0085*** (0.0026) | -0.0100*** (0.0023) |
| PhD (=1) | -0.0089 (0.0150) | -0.0095 (0.0149) | 0.0179 (0.0152) |
| Years of Teaching Experience (decades) | -0.0183*** (0.0038) | -0.0191*** (0.0042) | -0.0212*** (0.0032) |
| Female (=1) | 0.0092*** (0.0031) | 0.0096*** (0.0033) | 0.0056** (0.0027) |
| Age (100s yrs) | -0.0029 (0.0162) | -0.0016 (0.0165) | 0.0168 (0.0135) |
| Hispanic (=1) | 0.0207*** (0.0075) | 0.0216*** (0.0079) | 0.0297*** (0.0078) |
| Black (=1) | 0.0492*** (0.0102) | 0.0520*** (0.0113) | 0.0483*** (0.0085) |
| Asian (=1) | 0.0305** (0.0152) | 0.0299* (0.0154) | 0.0402*** (0.0150) |
| Pacific Islander (=1) | 0.0302 (0.0244) | 0.0311 (0.0253) | 0.0143 (0.0196) |
| American Indian (=1) | -0.0057 (0.0066) | -0.0057 (0.0068) | -0.0099 (0.0061) |
| Observations | 14030 | 14030 | 26510 |

Sample sizes rounded to nearest ten for confidentiality purposes.

Reporting probit estimates

High quality refers to teachers from Most and Highly Competitive colleges

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9. Marginal Effects of Teacher Quality & Charter School Participation, 2007-2008 Regular Teachers, Disaggregated Quality

| | Matched Quality | 2002 Ranks | |
|--|------------------------|------------------------|------------------------|
| | | Matched Sample | All FT/PT Teachers |
| Most Competitive College (=1) | 0.0442** (0.0189) | 0.0401*** (0.0151) | 0.0200** (0.0095) |
| Highly Competitive College (=1) | 0.0173** (0.0084) | 0.0125 (0.0085) | 0.0045 (0.0061) |
| Very Competitive College (=1) | 0.0185*** (0.0061) | 0.0162** (0.0067) | 0.0060 (0.0050) |
| Competitive College (=1) | 0.0038 (0.0047) | 0.0023 (0.0058) | -0.0031 (0.0044) |
| Less Competitive College (=1) | 0.0007 (0.0051) | -0.0003 (0.0061) | -0.0050 (0.0047) |
| Master's Degree (=1) | -0.0087*** (0.0024) | -0.0091*** (0.0026) | -0.0092*** (0.0021) |
| PhD (=1) | -0.0093 (0.0147) | -0.0109 (0.0142) | 0.0140 (0.0133) |
| Years of Teaching Experience (decades) | -0.0180*** (0.0038) | -0.0189*** (0.0042) | -0.0186*** (0.0028) |
| Female (=1) | 0.0096*** (0.0031) | 0.0098*** (0.0033) | 0.0052** (0.0024) |
| Age (100s yrs) | 0.0039 (0.0160) | 0.0004 (0.0165) | 0.0149 (0.0119) |
| Hispanic (=1) | 0.0207*** (0.0075) | 0.0218*** (0.0079) | 0.0270*** (0.0072) |
| Black (=1) | 0.0514*** (0.0106) | 0.0531*** (0.0115) | 0.0445*** (0.0080) |
| Asian (=1) | 0.0282* (0.0147) | 0.0272* (0.0148) | 0.0340** (0.0133) |
| Pacific Islander (=1) | 0.0311 (0.0250) | 0.0311 (0.0254) | 0.0126 (0.0176) |
| American Indian (=1) | -0.0053 (0.0066) | -0.0054 (0.0068) | -0.0084 (0.0055) |
| Observations | 14030 | 14030 | 26510 |

Samples rounded to nearest ten for confidentiality purposes.

Reporting marginal effects for bench mark case

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10 Marginal Effects Estimates of Teacher Quality & Charter Participation, 2007-2008 Teachers, by Cohort

| | Cohort Group | | | | | | | | |
|--|---------------------------------|----------------------------------|----------------------------------|----------------------------------|---------------------------------|-----------------------|----------------------------------|-----------------------|---------------------|
| | 1969-1970 ^a | 1983-1984 | 1985-1986 | 1991-1992 | 1993-1994 | 1995-1996 | 1997-1998 | 1999-2000 | 2001-2002 |
| Most Competitive College (=1) | | | | 0.0385 (0.0555) | | 0.0527 (0.0634) | 0.0954 (0.0673) | 0.1107* (0.0630) | 0.1153* (0.0658) |
| Highly Competitive College (=1) | 0.0022 ^b (0.0081) | | | 0.0246 (0.0239) | 0.0016 ^b (0.0255) | -0.0284* (0.0150) | 0.0888*** (0.0326) | 0.0612** (0.0300) | 0.0014 (0.0254) |
| Very Competitive College (=1) | -0.0006 (0.0044) | -0.0084 ^d (0.0174) | -0.0014 ^d (0.0030) | 0.0230 (0.0149) | 0.0043 (0.0218) | -0.0034 (0.0149) | 0.0665*** (0.0217) | 0.0381** (0.0189) | 0.0228 (0.0223) |
| Competitive (=1) | -0.0013 (0.0029) | -0.0038 (0.0158) | -0.0003 ^e (0.0028) | 0.0102 (0.0085) | -0.0115 (0.0172) | -0.0126 (0.0132) | 0.0258* (0.0143) | 0.0143 (0.0147) | 0.0142 (0.0189) |
| Less Competitive (=1) | | -0.0054 (0.0165) | -0.0029 (0.0033) | 0.0093 (0.0093) | 0.0130 (0.0215) | -0.0113 (0.0139) | 0.0060 (0.0152) | 0.0018 (0.0157) | -0.0034 (0.0198) |
| Graduate Degree (MA/PhD) (=1) | 0.0038 (0.0049) | 0.0031 (0.0103) | 0.0002 (0.0020) | -0.0062 (0.0048) | -0.0172* (0.0104) | -0.0178** (0.0089) | -0.0045 (0.0051) | -0.0181** (0.0086) | 0.0041 (0.0140) |
| Years of Teaching Experience (decades) | -0.0021 (0.0022) | -0.0250* (0.0150) | -0.0035 (0.0031) | -0.0239 (0.0165) | -0.0470** (0.0213) | -0.0338 (0.0220) | -0.0343* (0.0200) | -0.0004 (0.0239) | -0.0076 (0.0355) |
| Female (=1) | 0.0077* (0.0044) | 0.0087 (0.0125) | 0.0279* (0.0147) | 0.0104 (0.0071) | 0.0019 (0.0107) | 0.0416** (0.0166) | -0.0071 (0.0059) | 0.0149 (0.0095) | 0.0053 (0.0093) |
| Age (100s yrs) | 0.0551 (0.0672) | -0.0053 (0.0972) | -0.0030 (0.0156) | 0.0550 (0.0441) | -0.1156 (0.0874) | 0.0435 (0.0630) | -0.0356 (0.0556) | -0.0569 (0.0616) | 0.0100 (0.0636) |
| Hispanic (=1) | 0.0095 (0.0172) | 0.0194 (0.0315) | -0.0029 (0.0032) | 0.0090 (0.0121) | 0.0043 (0.0218) | 0.0329 (0.0285) | 0.0400 (0.0262) | 0.0179 (0.0184) | 0.0428 (0.0271) |
| Black (=1) | -0.0017 (0.0051) | 0.0128 (0.0245) | 0.0239 (0.0219) | 0.0162 (0.0147) | 0.0833** (0.0384) | 0.0807** (0.0353) | 0.0336 (0.0210) | 0.0872** (0.0347) | 0.0550 (0.0341) |
| Asian (=1) | 0.1834 (0.2253) | | 0.0207 (0.0335) | -0.0005 (0.0128) | 0.0898 (0.0692) | 0.0885 (0.0616) | | -0.0029 (0.0191) | 0.0230 (0.0413) |
| Pacific Islander (=1) | | | | | | 0.0926 (0.0944) | | 0.0109 (0.0519) | 0.0651 (0.1153) |
| American Indian (=1) | | | | | | 0.0034 (0.0221) | | -0.0184 (0.0154) | -0.0154 (0.0213) |
| Other Ethnicity (=1) | 0.0076 ^c (0.0170) | 0.0079 ^e (0.0341) | 0.0129 ^c (0.0168) | -0.0073 ^c (0.0065) | 0.0369 ^c (0.0390) | | -0.0157 ^e (0.0102) | | |
| Observations | 1230 | 980 | 1300 | 1470 | 1630 | 1780 | 1920 | 1980 | 1750 |

^a Reference group is teachers from Less and Non Competitive colleges due to few observations.

^b Estimate is for teachers from Most and Highly Competitive colleges due to few observations for Most Competitive colleges.

^c Other ethnicity includes American Indians and Pacific Islanders.

^d Estimate is for teachers from Most, Highly and Very Competitive colleges due to lack of observations

^e Other ethnicity includes Asians as well as American Indians and Pacific Islanders.

Sample sizes rounded to nearest 10 for confidentiality purposes

Reporting probit estimates.

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table 11. Marginal Effects Estimates of Teacher Quality & Charter Participation, 2003-2004 Teachers, by Cohort

| | Cohort Group | | | | | | | |
|--|----------------------------------|----------------------------------|---------------------------------|-----------------------|----------------------------------|-----------------------|-----------------------|---------------------------------|
| | 1969-1970 | 1983-1984 | 1985-1986 | 1991-1992 | 1993-1994 | 1995-1996 | 1997-1998 | 1999-2000 ^e |
| Most Competitive College (=1) | -0.0104 (0.0306) | 0.1511 (0.1098) | | 0.0537 (0.0423) | 0.0898 (0.0791) | 0.0790 (0.0685) | 0.1059* (0.0582) | |
| Highly Competitive College (=1) | -0.0022 (0.0278) | 0.0217 (0.0152) | 0.0012 ^c (0.0032) | 0.0244** (0.0115) | 0.0515** (0.0215) | 0.0572*** (0.0180) | 0.0398*** (0.0149) | 0.0544 ^c (0.0400) |
| Very Competitive College (=1) | | 0.0095 (0.0230) | | 0.0292 (0.0228) | 0.0694** (0.0309) | 0.0627** (0.0285) | 0.0240 (0.0182) | 0.0327 (0.0512) |
| Competitive (=1) | -0.0148 ^a (0.0266) | 0.0073 (0.0102) | 0.0049 ^a (0.0040) | 0.0265*** (0.0091) | 0.0357** (0.0149) | 0.0312*** (0.0109) | 0.0126 (0.0092) | 0.0423 (0.0295) |
| Less Competitive (=1) | -0.0136 (0.0270) | -0.0041 (0.0101) | -0.0006 (0.0022) | 0.0131* (0.0079) | 0.0215 (0.0167) | 0.0243** (0.0124) | 0.0169 (0.0118) | -0.0157 (0.0224) |
| Graduate Degree (MA/PhD) (=1) | -0.0074 (0.0126) | -0.0048 (0.0051) | -0.0008 (0.0010) | -0.0035 (0.0026) | -0.0063 (0.0055) | -0.0061 (0.0041) | -0.0062 (0.0062) | |
| Years of Teaching Experience (decades) | -0.0323 (0.0323) | -0.0123 (0.0107) | -0.0070 (0.0056) | -0.0250 (0.0166) | -0.0429* (0.0245) | -0.0303 (0.0197) | -0.0256 (0.0180) | 0.0876 (0.0618) |
| Female (=1) | -0.0136 (0.0168) | 0.0055 (0.0070) | 0.0123 (0.0075) | 0.0024 (0.0030) | -0.0077 (0.0059) | 0.0002 (0.0036) | 0.0089 (0.0059) | -0.0051 (0.0139) |
| Age (100s yrs) | -0.0867 (0.2915) | 0.0623 (0.0656) | 0.0044 (0.0084) | -0.0064 (0.0177) | 0.0376 (0.0400) | 0.0129 (0.0270) | 0.0401 (0.0337) | 0.0546 (0.0931) |
| Hispanic (=1) | 0.1132 (0.1061) | 0.0375 (0.0441) | -0.0006 (0.0019) | 0.0150 (0.0123) | 0.0219 (0.0192) | 0.0313 (0.0202) | 0.0376* (0.0225) | 0.0295 (0.0429) |
| Black (=1) | | 0.0141 (0.0254) | 0.0022 (0.0040) | 0.0398* (0.0220) | 0.0257 (0.0181) | 0.0535** (0.0254) | 0.0691** (0.0303) | 0.0176 (0.0328) |
| Asian (=1) | | | -0.0013 (0.0020) | 0.0030 (0.0068) | 0.0006 (0.0129) | -0.0025 (0.0078) | 0.0038 (0.0125) | -0.0065 (0.0300) |
| Pacific Islander (=1) | | | 0.0792 (0.0815) | 0.0180 (0.0209) | | -0.0038 (0.0140) | -0.0039 (0.0165) | |
| American Indian (=1) | | | 0.0004 (0.0032) | 0.0026 (0.0060) | | 0.0072 (0.0131) | -0.0036 (0.0101) | |
| Other Ethnicity (=1) | | -0.0001 ^b (0.0082) | | | -0.0062 ^d (0.0106) | | | 0.0144 ^d (0.0383) |
| Observations | 1820 | 1270 | 1560 | 2090 | 2050 | 2190 | 1860 | 510 |

^a Refers to estimate for teachers from Very Competitive and Competitive colleges grouped together due to few observations for Very Competitive.

^b Other ethnicity includes Asians, Pacific Islanders, and American Indians.

^c Refers to the estimate for teachers from Most and Highly Competitive colleges grouped together due to few observations.

^d Other Ethnicity includes Pacific Islanders and American Indians.

^e Graduate degree was not included due to collinearity.

Sample sizes rounded to nearest 10 for confidentiality purposes

Reporting probit estimates.

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1