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

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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

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 di¤erent academic focuses or may target di¤erent 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, Rocko¤ 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 di¤erent 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 di¤erence in the probability of teaching at a charter versus a public school for di¤erent quality teachers?

This paper's main contribution is the investigation of sorting decisions among di¤erent quality teachers and di¤erent cohorts of teachers using data from the 2007-2008 Schools and Sta¢ ng 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 classi…cations obscure distinctions in the choices made by teachers of di¤erent 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 di¤erences in charter and public schools. Section 6 details the estimation strategy. Section 7 discusses the study …ndings. Finally, section 8 concludes.

2 Teacher Quality Background

Measuring teacher quality is extremely di¢ cult. Most characteristics of e¤ective teachers such as passion, enthusiasm, work ethic, and people skills, are not easily measurable. Even so, studies have tried to …nd

quantitative and observable ways of measuring quality. Licensure, testing, certi…cation, 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 e¤ectiveness (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 Pro…les 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 …nal group. Ehrenberg and Brewer (1994), who provide the evidence that increases in teacher quality, as measured by the Barron's ranking, does signi…cantly 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 e¤ects of …ner quality levels on their outcomes.

[1] Some 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 a¤ect 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 Pro…les of American by*

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, 18,100[4] 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.

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

college. Of these, 17,290 were full or part time regular teachers[5]. 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 …nding a charter job is di¤erent for these teachers than for those educated in charter states[6].

To highlight the importance of the matched ranking measure, this study also uses a reference year teacher quality measure to illustrate di¤erences 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

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

Responses indicate that while charter teachers are less satis..ed with their salaries than public teachers, they are not more likely to leave for greater pay. They are less satis..ed 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 sta¤ 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 satis..ed with their schools and more worried about their jobs than public teachers, they are still maintaining their enthusiasm. The support from sta¤, communication

of the relationship.

This paper takes a di¤erent viewpoint and investigates how teacher characteristics, in particular, teacher quality in‡uences 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.

variable equal to one if teachers are from Very Competitive, Competitive, or Less Competitive colleges. Non Competitive teachers comprise the …nal group. In the second speci…cation, each ranking is included as a binary variable. This speci…cation is of the most interest, as it clearly illustrates what the e¤ects are for di¤ering levels of quality and indicates if there is a stronger e¤ect for better quality teachers. This paper estimated both speci…cations using the matched and the 2002 ranking to investigate how a reference year might distort …ndings.

For all speci…cations, $\boldsymbol{S}_i$ is a vector of educational attainment variables, including if teacher ***i*** obtained either a Master's degree or a Ph.D.[8]. Finally, $\boldsymbol{X}_i$ 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 measure[9].

The estimates a¢ rm the model is plausible as the coe¢ cients all exhibit the expected signs. With respect to controls, the negative and signi…cant coe¢ cient 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 signi…cant coe¢ cients 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 e¤ective will choose to teach where she shares the ethnicity of the students.

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

The quality estimates imply that Higher Quality teachers are signi…cantly more likely to work at a charter than their lowest quality counterparts. There is no e¤ect for Lower Quality teachers.

Comparing the results in Column 1 to those in Column 2 to determine if the di¤erence in assigning ranks matters, the reference year produces a lower point estimate with a lower signi…cance on the quality variables than the matched measure[10]. 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 insigni…cant. The studies would have erroneously concluded there was no quality e¤ect, while the matched ranking indicates that there is one.

Table 8 reports the marginal e¤ects 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 …rst 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 …nds that females are nearly 22% more likely to work at a charter school than males.

The biggest e¤ect 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 e¤ect, the Column 1 …nds 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 signi…cantly more likely to work at a charter school than the lowest quality benchmark.

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

For the reference year marginal e¤ects, 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 e¤ect

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

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

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 analysis[12]

sort between public and charter schools. The …ndings 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 e¤ects 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 e¤ects 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 …nds that aggregating quality levels can mask e¤ects of …ner quality distinctions and lead to erroneous conclusions. Furthermore, since competitiveness and rankings are dynamic, this paper …nds that using a single reference year to measure competitiveness can be misleading and distort results. The distortion consistently underestimates the di¤erences 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 a¤ects 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

	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								

Table 2 Frequencies of College Competitiveness among Teachers in Matched Sample

	N	%	N	%	N	%	N	%
Non Competitive	0	0.0	40	3.3	0	0.0	30	2.5

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

	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		Tf(14.530)1.24					
	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 5. Differences between Charter and Public School Base & Total 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
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

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

	Charter		Public				
	Mean	n	Mean	n	Difference	t-stat	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

	Matched Quality	Matched Sample	All FT/PT Teachers
Higher Quality (=1)	0.2679***	0.2312**	0.1012
	(0.0962)	(0.0948)	(0.0709)

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

Sample sizes rounded to nearest ten for confidentiality purposes.

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

		2002 Ranks	
	Matched Quality	Matched Sample	All FT/PT Teachers
Most Competitive College (=1)	0.0442**	0.0401***	0.0200**
	(0.0189)	(0.0151)	(0.0095)
Highly Competitive College (=1)	0.0173**	0.0125	0.0045
	(0.0084)	(0.0085)	(0.0061)
Very Competitive College (=1)	0.0185***	0.0162**	0.0060
	(0.0061)	(0.0067)	(0.0050)
Competitive College (=1)	0.0038	0.0023	-0.0031
	(0.0047)	(0.0058)	(0.0044)
Less Competitive College (=1)	0.0007	-0.0003	-0.0050
	(0.0051)	(0.0061)	(0.0047)
Master's Degree (=1)	-0.0087***	-0.0091***	-0.0092***
	(0.0024)	(0.0026)	(0.0021)
PhD (=1)	-0.0093	-0.0109	0.0140
	(0.0147)	(0.0142)	(0.0133)
Years of Teaching Experience (decades)	-0.0180***	-0.0189***	-0.0186***
	(0.0038)	(0.0042)	(0.0028)
Female (=1)	0.0096***	0.0098***	0.0052**
	(0.0031)	(0.0033)	(0.0024)
Age (100s yrs)	0.0039	0.0004	0.0149
	(0.0160)	(0.0165)	(0.0119)
Hispanic (=1)	0.0207***	0.0218***	0.0270***
	(0.0075)	(0.0079)	(0.0072)
Black (=1)	0.0514***	0.0531***	0.0445***
	(0.0106)	(0.0115)	(0.0080)
Asian (=1)	0.0282*	0.0272*	0.0340**
	(0.0147)	(0.0148)	(0.0133)
Pacific Islander (=1)	0.0311	0.0311	0.0126
	(0.0250)	(0.0254)	(0.0176)
American Indian (=1)	-0.0053	-0.0054	-0.0084
	(0.0066)	(0.0068)	(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 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	0.1511		0.0537	0.0898	0.0790	0.1059*	
	(0.0306)	(0.1098)		(0.0423)	(0.0791)	(0.0685)	(0.0582)	
Highly Competitive College (=1)	-0.0022	0.0217	0.0012[c]	0.0244**	0.0515**	0.0572***	0.0398***	0.0544[c]
	(0.0278)	(0.0152)	(0.0032)	(0.0115)	(0.0215)	(0.0180)	(0.0149)	(0.0400)
Very Competitive College (=1)		0.0095		0.0292	0.0694**	0.0627**	0.0240	0.0327
		(0.0230)		(0.0228)	(0.0309)	(0.0285)	(0.0182)	(0.0512)
Competitive (=1)	-0.0148[a]	0.0073	0.0049[a]	0.0265***	0.0357**	0.0312***	0.0126	0.0423
	(0.0266)	(0.0102)	(0.0040)	(0.0091)	(0.0149)	(0.0109)	(0.0092)	(0.0295)
Less Competitive (=1)	-0.0136	-0.0041	-0.0006	0.0131*	0.0215	0.0243**	0.0169	-0.0157
	(0.0270)	(0.0101)	(0.0022)	(0.0079)	(0.0167)	(0.0124)	(0.0118)	(0.0224)
Graduate Degree (MA/PhD) (=1)	-0.0074	-0.0048	-0.0008	-0.0035	-0.0063	-0.0061	-0.0062	
	(0.0126)	(0.0051)	(0.0010)	(0.0026)	(0.0055)	(0.0041)	(0.0062)	
Years of Teaching Experience (decades)	-0.0323	-0.0123	-0.0070	-0.0250	-0.0429*	-0.0303	-0.0256	0.0876
	(0.0323)	(0.0107)	(0.0056)	(0.0166)	(0.0245)	(0.0197)	(0.0180)	(0.0618)
Female (=1)	-0.0136	0.0055	0.0123	0.0024	-0.0077	0.0002	0.0089	-0.0051
	(0.0168)	(0.0070)	(0.0075)	(0.0030)	(0.0059)	(0.0036)	(0.0059)	(0.0139)
Age (100s yrs)	-0.0867	0.0623	0.0044	-0.0064	0.0376	0.0129	0.0401	0.0546
	(0.2915)	(0.0656)	(0.0084)	(0.0177)	(0.0400)	(0.0270)	(0.0337)	(0.0931)
Hispanic (=1)	0.1132	0.0375	-0.0006	0.0150	0.0219	0.0313	0.0376*	0.0295
	(0.1061)	(0.0441)	(0.0019)	(0.0123)	(0.0192)	(0.0202)	(0.0225)	(0.0429)
Black (=1)		0.0141	0.0022	0.0398*	0.0257	0.0535**	0.0691**	0.0176
		(0.0254)	(0.0040)	(0.0220)	(0.0181)	(0.0254)	(0.0303)	(0.0328)
Asian (=1)			-0.0013	0.0030	0.0006	-0.0025	0.0038	-0.0065
			(0.0020)	(0.0068)	(0.0129)	(0.0078)	(0.0125)	(0.0300)
Pacific Islander (=1)			0.0792	0.0180		-0.0038	-0.0039	
			(0.0815)	(0.0209)		(0.0140)	(0.0165)	
American Indian (=1)			0.0004	0.0026		0.0072	-0.0036	
			(0.0032)	(0.0060)		(0.0131)	(0.0101)	
Other Ethnicity (=1)		-0.0001[b]			-0.0062[d]			0.0144[d]
		(0.0082)			(0.0106)			(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