

# How Teachers' Choices Affect What a Dollar Can Buy: Wages and Quality in K-12 Schooling

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**Abstract:** This paper examines the distribution of teachers across schools and districts and the distribution of teacher salaries across districts both in New York State and nationally. It finds that much of the variation in teacher qualifications across schools is within districts. Salary schedules do not vary within districts. Thus, current salary differences are neither driving nor alleviating many of the disparities in teacher qualifications across schools. These disparities appear to be driven primarily by teacher preferences for high-achieving, high-socioeconomic-status students or for the working conditions in the schools these students attend. Targeted salary increases and/or targeted improvements in working conditions are needed to draw high-quality teachers to low-performing schools and to alleviate the inequities we see in the quality of the teaching force across the state and across the country.

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## **How Teachers' Choices Affect What a Dollar Can Buy: Wages and Quality in K-12 Schooling**

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### **I. Introduction**

Class size reduction in California resulted in an increase in demand for teachers across the state. Teachers in schools with low-achieving students chose to move to higher-achieving schools, leaving many high-poverty districts with vacancies and unqualified instructors (Betts, Rueben, and Danenberg 2000; Bohrnstedt and Stecher 1999). Teachers' preferences created disparities in schools' ability to attract and retain high-quality teachers. While this reform brought to light the importance of considering teachers' reactions when designing policy, the implications of teachers' preferences for school quality extend beyond the impact of recent school reform. Teacher preferences impact school quality in every state and at all times.

Teachers, like most workers, value high salaries; they also care about the types of students they teach and the environments in which they work. While schools can all pay the same amount for a textbook or a computer, the same teacher will cost different schools different amounts. If schools with unattractive working conditions wish to hire and retain the same quality teachers as other schools, they will need to improve these conditions or pay higher salaries.

In this paper, I examine the disparities in teachers across schools and the potential role for targeted salary increases in alleviating these disparities. I start by looking at the current distribution of teachers in New York State and asking whether the differences that we see across schools in average teacher qualifications are systematically related to the characteristics of schools such as urban status and the demographic composition of the student body. In Section III, I identify forces contributing to the differences in teacher qualifications across schools and discuss whether or not these disparities are likely to reflect actual differences in teacher skills. The fourth section of the paper addresses the current distribution of teacher salaries across New York State and the fifth section reviews what we know from existing research about the impact of salaries on teacher choices and student outcomes.

In the final section of the paper, I conclude with implications for wage policies aimed at attracting and retaining high-quality teachers, especially in low-performing schools. My central conclusions are:

- Much of the variation in teacher attributes across schools is within districts and salary schedules do not vary within districts. Thus, current salaries are neither driving nor alleviating many of the disparities we see. These disparities are driven primarily by teachers' preferences for high-achieving, high-socioeconomic-status students or for the working conditions in the schools these students attend.
- However, teachers do respond to incentives based on increased salaries and improved working conditions. Targeted salary increases and/or targeted improvements in working conditions in difficult-to-staff schools are needed to draw high-quality teachers to low-performing schools and to alleviate the disparities we see across the state and across the nation in the quality of the teaching workforce.

## **II. Disparities in Teacher Qualifications across Schools**

Previous studies have found large differences in teacher characteristics across schools and districts. In California, for example, Betts, Rueben, and Danenberg (2000) found disparities across districts in the percentage of teachers who lack a full credential, lack a master's degree, and have taught for fewer than three years. In New York, Lankford (1999) and Lankford, Wyckoff, and Papa (2000) found that New York City teachers are substantially less qualified than teachers in the surrounding suburbs and the rest of the state as indicated by a variety of factors. For example, a third of all New York City teachers taking the New York State Liberal Arts and Sciences (certification) Test failed the exam at least once, compared to only 4.7 percent outside New York City.

Using data from New York on the average characteristics of teachers in a school, I rank all schools in the state with more than five teachers and more than 50 students. I then record the average characteristics of those schools at the 5<sup>th</sup>, 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, 90<sup>th</sup> and 95<sup>th</sup> percentile for each characteristic. Those numbers appear in figure 1. The measures I use include the percentage of teachers with tenure, the percentage not certified, the percentage fully certified in all subjects taught, the percentage with educational attainment of no more than a bachelor's degree, the percentage with at least a master's degree and 30 units of additional credit, the percentage who failed the National Teacher Exam (NTE) in communication skills, the percentage who failed the NTE General Knowledge Exam, the percentage who failed the NTE Professional Knowledge Exam, the percentage who attended most competitive and highly competitive schools as assessed by Barron's, and the percentage who attended competitive, less competitive, or non-competitive schools.

The differences across schools are striking. For example, in five out of every 100 schools (5<sup>th</sup> percentile) fewer than three percent of the teachers have an M.A. plus 30 units of

credit or more, while in another five percent of schools (95<sup>th</sup> percentile) more than 60 percent of teachers have this educational attainment. Similarly, five percent of schools have fewer than 50 percent of teachers fully certified, while 10 percent of schools have over 90 percent fully certified. We also see many schools in which no teachers have failed exams, yet in at least five percent of the schools over one third of all teachers who have taken the NTE exams have failed them.

These school average teacher characteristics are correlated with each other. Schools with teachers who failed one exam are more likely to have teachers who failed the other exams (correlations of approximately 0.78); schools with high proportions of teachers who failed exams are more likely to have teachers from less competitive colleges (correlations of approximately 0.35); schools with teachers from less competitive colleges are more likely to have teachers with no more than a bachelor's degree (correlation=0.17); and schools with teachers with no more than a bachelor's degree are less likely to have teachers with tenure (correlation = -0.66 ).

Moreover, the differences across schools in teacher qualifications are related to measurable characteristics of the schools. Urban schools differ from suburban and rural schools; schools with high proportions of minority students differ from schools with low proportions of minority students; schools with many children in poverty differ from schools with few children in poverty. Figure 2 shows average teacher characteristics in urban, suburban, and rural schools in New York. We see that urban schools have fewer tenured teachers, more uncertified teachers, fewer fully certified teachers, more teachers with no more than a B.A. degree, more teachers who have failed the communication skills and general knowledge exams, and more teachers who attended least competitive colleges.

In order to look more systematically at the distribution of teacher qualifications and the relationship between these teacher measures and other school characteristics, I use factor analysis to create a summary variable that combines the individual measures of schools' teacher characteristics. Appendix table 1 describes the components of this measure. It includes average teacher test scores and the percentage of teachers failing the NTE Communications Skills Exam, the NTE General Knowledge Exam, the NTE Professional Knowledge Exam, the NYSTCE Liberal Arts and Sciences Test, and the NYSTCE Assessment of Teaching Skills (elementary and secondary). It also includes the percentage of teachers who graduated from colleges Barrons rated most competitive or highly competitive, the percentage of teachers who graduated from very competitive colleges, the percentage of teachers who graduated from competitive colleges, the percentage of teachers with tenure, the percentage of teachers with no more than a B.A. degree, the percentage of teachers with at least an M.A. degree, the percentage of teachers not certified in any subject taught, and the percentage of teachers certified in all subjects taught. This composite measure has an average of zero and a standard deviation of one across schools.

I use the composite teacher qualification measure and ordinary least squares regressions to distinguish the relationships between teacher qualifications and various school

characteristics. (See Table 1a for results.) The analysis shows that urban schools have substantially (one half a standard deviation) less qualified teachers than rural or suburban schools. Schools with a higher proportion of black or Hispanic students also have less qualified teachers. For example, schools with ten percentage points more black students tend to have teachers with .13 standard deviations lower qualifications. Unfortunately, I have reliable student poverty measures only for elementary schools. When I restrict the sample to these schools and run a similar regression including a measure of the percentage of children in poverty, I find that schools with a higher proportion of poor children have significantly less qualified teaching staffs.<sup>1</sup>

Tables 1b and 1c present similar results for two of the component measures of teacher qualifications, average NTE General Knowledge score and the percentage of fully certified teachers. The same pattern emerges. Urban schools and schools with high proportions of black and Hispanic students have teachers with lower test scores and less complete certification. The estimates imply that schools with 10 percent more Hispanic students, for example, have 2.8 percentage points fewer fully certified teachers. Urban schools have teachers whose average scores are 2.9 points (one half a standard deviation) lower on the NTE General Knowledge Exam than teachers in rural schools.

A targeted increase in the salary schedules of certain districts may impact the distribution of teachers among districts but is unlikely to impact the distribution of teachers within districts. Because of this, it is important to know whether most of the variation in teacher quality is across districts or among schools within the same district. In New York State, for the summary measure of teacher qualifications, more than 30 percent of variation is among schools within the same district.<sup>2</sup> For the two component measures, more than 50 percent of the variation in average NTE General Knowledge score and in the percentage of fully certified teachers is among schools within the same districts. Studies in California have shown similarly large variation in school average teacher attributes within and between districts (Betts et al. 2000). Thus, differences in average teacher qualifications exist both across districts and across schools within districts. State policies aimed at differences across districts will address only part of the disparities, not the substantial within-district differences.

The question arises of whether the distribution of teacher characteristics within districts looks like the variation among districts. That is, within districts, are average teacher characteristics correlated with student demographics in the way observed across all schools in the state? The within-district differences are unlikely to be driven by differences in wage schedule or district policies such as hiring practices. They may be driven by differences between schools, such as differences in student demographics and working conditions and by teachers' preferences for school characteristics. I address this question by including controls for each district in the regression analysis (as reported in the third column of tables 1a, 1b, and 1c). I find that even within districts, schools with a

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<sup>1</sup> The results of this analysis are available from the author upon request.

<sup>2</sup> This proportion is not substantially different when looking only across elementary schools (where the proportion within districts is slightly higher) or across middle schools or high schools (where the proportion is slightly lower).

higher proportion of black or Hispanic students have lower average teacher qualifications.

Now let us turn to variation in teacher characteristics among districts instead of among schools. Using a district-level regression of the teacher qualifications and district characteristics (as summarized in the fourth column of table 1a), I find that districts with a higher proportion of black and Hispanic students, again, have lower average teacher characteristics. Districts with higher proportions of poor students, as indicated by the percentage of kindergarten through sixth grade students who receive free or reduced-price lunches, also score lower on the composite measure of teacher qualifications. Now let's take this one step further. Districts operate within regions of the state. Each region, to a large extent, is likely to be its own labor market. Perhaps some potential teachers, when looking for a job, consider schools in multiple regions; however, the majority of teachers are likely to limit their search to smaller geographic areas. Because of these search restrictions, potential teachers will be especially influenced by the alternative occupational opportunities in the particular region they are considering.

Labor market characteristics, such as the availability of jobs in alternative occupations and the wages in those jobs, are likely to impact the overall teacher workforce in a region. District policies and the distribution of students across schools and districts are likely to influence teacher sorting into districts within regions. When assessing the usefulness of policies aimed at attracting and retaining high-quality teachers, it is useful to distinguish between policies that affect the entire pool of teachers in a particular region or labor market and those that affect the sorting of teachers among districts within labor markets.

In an attempt to distinguish between labor market effects and district effects, I look at differences in teacher characteristics across and within 10 regions of New York State. While these 10 regions are unlikely to define perfectly separate labor markets in the sense that no potential teacher chooses among jobs in more than one area, most teachers are likely to look primarily in one region or another. The regions that I look within are (1) the area including Albany, Schenectady, and Troy; (2) the Buffalo region; (3) New York City, Yonkers, and the surrounding suburbs; (4) Nassau and Suffolk; (5) the Rochester area; (6) the Syracuse area; (7) the area including Utica and Rome; (8) the Mid-Hudson region; (9) the Southern Tier; and (10) the North Country.

Among the district variation in the summary measure of teacher qualification, most is due to differences within regions. That is, most of the variation in teacher qualifications results from the sorting of teachers among districts (and schools) within a region, not from differences in the average qualifications of teachers in different regions of the state. Among districts within the same region, those with higher proportions of black students, Hispanic students, and kindergarten through sixth grade students who receive free or reduced-price lunches have teachers with lesser qualifications. (See the final column of table 1a.) Similarly, among districts within a labor market, urban schools and schools with a high proportion of black students, Hispanic students, and students in poverty have teachers with lower average test scores. While the racial/ethnic and urban status results

do not hold for the certification measure, I do find that schools with a higher proportion of poor students have a lower proportion of fully certified teachers as well.

There is no national data available with the depth of the New York teacher measures and the coverage of schools within districts. However, the Schools and Staffing Survey (1993) can be used to look at the average quality of teachers' undergraduate institutions across districts. In keeping with the results above, I find that less than one third of the variation in this measure among districts is due to differences across metropolitan areas (labor markets). The majority of the variation occurs within metropolitan areas. Also, similarly, I find both within and among labor markets, districts with higher proportions of black students and students in poverty have more teachers with degrees from less competitive colleges.

In summary, schools differ substantially in teacher qualification both nationally and within New York State. Considerable variation exists both across districts and among schools within districts. Less variation in average teacher qualifications is apparent across regions of New York State and across metropolitan areas in the U.S. Across the board, there is a powerful relationship between the demographic composition of the student body and teacher qualifications. Schools with higher proportions of minority students and poor students have less qualified teachers.

### **III. The Impact of Teacher Disparities on Students**

Strong evidence supports the conclusion that that teachers affect student learning. Certainly, there is anecdotal evidence, but on top of this, recent papers by Rivkin, Hanushek, and Kain (2000) and Sanders and Horn (1994) find that achievement gains by students over an academic year are strongly influenced by the teacher whose class they attend. Rivkin and his co-authors attribute at least seven percent of the total variance in test score gains to differences in teachers, and they argue that this is a lower bound.

While there is general agreement that specific teachers strongly influence student learning, there is less agreement over the effect of particular teacher attributes. Many studies have employed measures of years of education, whether or not the teacher holds a master's degree, whether or not the teacher is certified, and years of teaching experience when assessing teacher effects. These are clearly weak measures of teaching ability, and they have not been found to consistently affect students (Hanushek 1986 and 1997). However, studies with richer detail on teachers often have been able to find effects on student outcomes. For example, Ferguson (1991) finds that in Texas teacher performance on a statewide certification exam is positively related to student outcomes, and Ehrenberg and Brewer (1994) find that the selectivity of the college a teacher attends positively influences test score growth.

The large differences that we see in teacher qualifications may not be important. That is, although we see differences in measurable characteristics of teachers across schools, these differences either may be due to chance or may simply not reflect real differences in teaching skill across schools. Measuring teacher quality is a difficult task. Rivkin et

al. create value-added measures for teachers in Texas schools, defining teacher quality by the test score gains of students. They find little correlation between this quality measure and characteristics of teachers, suggesting that true teaching skill is not reflected in measurable characteristics of teachers. However, the teacher characteristic measures they employ are not as strong as those available for New York State. In addition, there is some concern that value-added quality measures may be inaccurate and that this inaccuracy may lead to an underestimation of the relationship between value-added quality and other teacher attributes. The authors are likely to explore this concern in ongoing research, but we do not yet know the results.

With our current knowledge, there is every reason to believe that the differences we observe in teacher qualifications across New York State are differences (though not perfectly measured) in teacher quality. This is not to say that each individual measure should be viewed as a measure of quality. For example, we should not conclude that requiring a master's degree would improve the quality of the teaching workforce. There are believable arguments for why such requirements would decrease quality.<sup>3</sup> However, the strong correlation among the various teacher measures, combined with the reliability of many of the individual measures, strongly suggests that the differences we see in qualifications reflect differences in teacher quality.

Assuming that the disparities we see do reflect quality differences, what drives these differences? They may be driven simply by differences in the preferences of district residents. That is, one district may strive to hire one type of teacher and another may strive to hire a different type of teacher. Even if both districts are choosing from the same pool of potential teachers, they will end up with teaching staffs that differ systematically. The high correlation among the teacher measures brings the importance of this sorting mechanism into question. It is difficult to imagine that any district is seeking out uncertified teachers with lower test scores, from less competitive colleges, and with less training beyond a bachelor's degree.

There are more likely causes for the differences that we see. First, districts differ, not in their preferences but in the efficiency of their hiring practices. This will lead to systematic differences in teachers across districts. Districts with efficient hiring (aggressive recruiting, spring job offers, etc.) will end up with higher-quality teaching staffs even though they are initially faced with the same pool of potential teachers. This will influence the sorting of teachers across districts, though it is less likely to affect the substantial within-district sorting.

The most likely cause of the disparities across schools is teacher preferences. Potential teachers prefer one type of district to another, and within districts they prefer one school to another. In Texas, Hanushek, Kain, and Rivkin (1999) found teachers moving to schools with high-achieving students. In New York City, Lankford (1999) found experienced teachers moving to high-socioeconomic-status schools when positions became available. Teacher preferences result in the uneven distribution of teaching skills

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<sup>3</sup> Such requirements may both discourage high-quality college graduates from pursuing a teaching career and lead to the proliferation of low-quality master's programs.



across schools, with low-performing schools and schools with many students in poverty having the greatest difficulty attracting teachers.

#### IV. Differences in Salary Schedules across Districts

Now let's turn to wages. There is generally no variation in the salary structure for teachers within a district. Among districts in New York State 72 percent of the variation in starting salaries for teachers with master's degrees is among regions (not among districts within regions). For teachers with 20 years of experience 79 percent of the variation is among regions (again, not among districts within regions). Similar trends hold nationally. For the 184 metropolitan areas with 4 or more districts in the Schools and Staffing Survey, 75 percent of the variation in starting wages (B.A. no experience) and 77 percent of the variation in salary for teachers with an M.A. and 20 years of experience is across, not within, metropolitan areas.<sup>4</sup> This suggests that the bulk of the variation in salaries is not contributing to the sorting of teachers across districts or schools within labor markets.

Yet variation in salary does exist within regions and this variation appears to be large enough to influence teacher sorting. To help assess whether these differences are likely to be contributing to teacher sorting, figure 3a plots the 10<sup>th</sup> percentile starting salary, the median starting salary, and the 90<sup>th</sup> percentile starting salary for each region of the state. It shows that approximately 10 percent of districts have starting salaries lower than \$28,000, while another 10 percent have starting salaries higher than \$42,000.<sup>5</sup> The highest salaries are in the New York City region and in the Nassau and Suffolk region, although it is important to note that salaries in the New York City School District are not as high as the salaries in other districts in the New York City region. The lowest average salaries are in the Utica and Rome region. The Mid-Hudson region has the biggest variation in starting salaries, with 10 percent of districts offering starting salaries less than approximately \$27,000 and 10 percent offering starting salaries more than approximately \$37,000. Within regions, the difference in starting salaries between districts at the 90<sup>th</sup> percentile and those at the 10<sup>th</sup> percentile ranges from \$4,477 in the Utica and Rome region to \$9,962 in the Mid-Hudson region. These differences are economically substantial and may be contributing to sorting among districts within a region.

As a check on the magnitude of salary differences across districts, figure 3b summarizes the distribution of salaries for teachers with 20 years of experience. The variation across districts is even larger for experienced teachers. Approximately 10 percent of districts have salaries lower than \$43,500 for these teachers, while another 10 percent have starting salaries higher than \$74,900. Again, the New York City area and Nassau and Suffolk pay the highest salaries. The Southern Tier, and not the Utica-Rome region, pays the lowest salaries for this group. Within regions, the difference in salaries between

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<sup>4</sup> This breakdown of variation between and within metropolitan statistical areas (MSAs) is not substantively dependent on the number of MSAs or the number of districts within MSAs. When I use only the 54 MSAs with ten or more districts I find 70 percent of the variation between MSAs. When I use only the eight MSAs with 25 or more districts I find 66 percent of the variation between MSAs.

<sup>5</sup> 1998-1999 academic year.

districts at the 90<sup>th</sup> percentile and those at the 10<sup>th</sup> percentile ranges from \$8,521 in the North Country to \$19,814 in the Mid-Hudson region. Again, these differences are likely to be large enough to impact teacher sorting.

Salary schedules may allocate high wages for starting teachers or trade off starting salaries for increased compensation for teachers with more experience. These salary structure choices may be a function of the composition of the districts' teaching forces and may have implications for the quality of teachers districts are able to attract. That is, districts with many highly experienced teachers may be pushed in labor negotiations to increase salaries of experienced teachers. On the other hand, potential teachers may be more influenced by starting salaries than by increases from experience when choosing jobs. While figures 3a and 3b show differences across districts in the salary for starting teachers and teachers with 20 years of experience, we cannot tell from these figures how much teacher wages grow with experience. We also do not know whether districts with higher starting wages tend to pay lower wages for those with experience or whether higher starting salaries are an indication of higher salaries across the range of experience.

A simple correlation between the two salary measures (0.81) shows that districts with higher starting salaries tend to pay higher salaries for teachers with substantial experience. This relationship differs across regions of the state but in general, high-salary districts are high-salary districts across the board.<sup>6</sup>

Table 2 describes how wages grow with experience for districts in New York State. If we rank all districts in the state by the salary premium for 20 years' experience, we find that the district in the middle pays \$23,031 dollars (or 69 percent) more to teachers with 20 years' experience than to starting teachers. Ten percent of districts have premiums less than \$13,143 or 43 percent and 10 percent have premiums greater than \$34,310 or 102 percent. The premiums are high in New York relative to the rest of the country. Estimates from the 1993 Schools and Staffing Survey show a median return to 20 years' experience of 53 percent (compared to 69 percent for New York). Ten percent of districts nationwide have returns of less than 27 percent, while only another 10 percent have returns greater than 78 percent. Within New York State, Syracuse, the Southern Tier and the North Country have returns to experience in keeping with the national average, while the rest of the state tends to pay more for experience.<sup>7</sup>

Like teacher qualifications, salaries are not randomly distributed across districts. Table 3 shows that starting salaries tend to be lower in urban districts (approximately \$2,472) and suburban districts (approximately \$2,831) compared to rural districts within the same region. Salaries are higher in districts with higher proportions of black and Hispanic students, and substantially higher in districts with higher proportions of Asian students. Districts with a higher proportion of students in poverty pay lower teacher salaries. The

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<sup>6</sup> The correlations are 0.32 for the Albany area, 0.05 for the Buffalo region, 0.49 for New York City and Yonkers region, 0.33 for Nassau and Suffolk, 0.36 for the Rochester region, 0.31 for the Syracuse area, .13 for the Southern Tier, 0.39 for the North Country, and -0.35 for the Utica and Rome region.

<sup>7</sup> The New York City salary schedule is not as back loaded as those in the surrounding suburbs. This may be due to the high proportion of inexperienced teachers in the city or to a desire to attract new teachers.

differences by students' race/ethnicity and income are the same for salaries for teachers with 20 years of experience. The gain between starting salaries and 20-year salaries is greatest in urban and suburban schools and in districts with lower proportions of children in poverty.

## **V. The Impact of Wages on Teachers' Choices and Students' Outcomes**

There is a large literature suggesting that teachers respond to wages. Studies of the decision to enter teaching typically rely on national survey data such as the National Longitudinal Study of the High School Class of 1972 (Manski 1987, Stinebrickner 2000), High School and Beyond (Hanushek and Pace 1995) and comparable data from the U.K. (Dolton 1990, 1993; Dolton and Makepeace 1993). As a group, these studies show that individuals are more likely to choose to teach when starting teacher wages are high relative to wages in other occupations. National survey data also has been used to study teacher quits and occupational change (Baugh and Stone 1982, Dolton and van der Klaaw 1999, Rickman and Parker 1990, and Stinebrickner 1998 and 1999). Baugh and Stone (1982), for example, find that teachers are at least as responsive to wages in their decision to quit teaching as are workers in other occupations. Teachers are more likely to quit when they work in districts with lower wages. Many more papers have employed administrative data to study teacher quits and transfers. Findings by Brewer (1996); Mont and Reece (1996); Murnane, Singer, and Willett (1989); Theobald (1990); and Theobald and Gritz (1996) underscore the importance of higher teacher wages, especially relative to alternative wage opportunities.

These findings may appear to contradict the results of qualitative studies such as those by Berliner (1987); Feistritzer (1992); Murphy (1987); and Wise, Darling-Hammond, and Praskac (1987), which tend to find that ideology and the value individuals place on education for society are important in decisions regarding whether and where to teach. However, because individuals' answers to questions may not reflect their actions, factors less emphasized by respondents, such as wages and job stability, may still be relatively important to teachers.

The research clearly suggests that wages can be influential in attracting college graduates to teaching. However, we cannot conclude that wage increases will increase the quality of teachers in a school. First, while wage increases may increase the number of available teachers, they may not increase the quality of available teachers. In the extreme, if only low-quality teachers responded to pay raises, then increasing the wage would not increase quality. There is no indication that this is the case; however, there is also little indication that increasing the wage draws disproportionately higher-quality teachers (Manski 1987, Hanushek and Pace 1995). Wage increases are likely to increase the pool of all teachers. In order to increase teacher quality, districts will need to be selective in their hiring. We know little about how effective districts are in their hiring decisions. There is some evidence that many districts do not do a good job in selecting teachers (Ballou 1996, Ballou and Podgursky 1995 and 1997, Murnane et al. 1991).

Assessing the effect of teacher salaries on the quality of teachers a school is able to attract is difficult because, as we have seen above, wages are not randomly distributed across districts. Some schools pay higher wages partially to compensate for characteristics of the school that teachers do not like. If we did not take this into account we would see lower-quality teachers at these high-paying schools. Similarly, if districts in labor markets in which teachers can receive higher wages in alternative occupations partially compensate for these better opportunities with higher salaries, we again would see lower-quality teachers in higher-paying schools.

To assess the potentially confounding effect of alternative wages, I use national data and ordinary least squares regressions to look at the relationship between the average teacher wage in metropolitan areas and the average income for non-teaching working women college graduates, controlling for the average income of working men. The female income measure captures alternative opportunities for teachers; the male income measure adjusts for district income not linked to alternative opportunities. I run a similar analysis adjusting for district characteristics. Table 4 summarizes the results. In both cases, metropolitan areas with greater opportunities for potential teachers tend to pay teachers higher salaries. Each dollar increase in alternative salaries corresponds to a \$.34 to \$.46 increase in teacher salaries. Thus, salary differentials across regions reflect differences in the alternative opportunities available to teachers. The regional teacher wage differences do not necessarily correspond to differences in the ability of regions to attract and retain high-quality teachers, though in some instances they may.

An analysis of the relationship between wages and teacher qualifications in New York underscores the importance of taking these regional differences into account when assessing the relationship between wages and quality. (See table 5.) When we look at this relationship across all districts in New York State, we see that, on average, districts with higher starting salaries have lower-quality teachers. However, once we include controls for region of the state (in the second column), and thereby adjust for alternative labor market opportunities, we see a positive and significant relationship between wages and qualifications. This should not be taken as a causal effect since there are many district-level factors not accounted for; instead, it is an indication of the complicated relationship between wages and teacher quality and the importance of considering alternative opportunities available to teachers.

Another way to assess whether wages can be used to attract higher-quality teachers is to look at the effect of wages on student outcomes. In a paper looking across states in the U.S. from 1960 through 1990 and across districts in California from 1975 through 1995, Loeb and Page (2000) found that student educational attainment increased most in states and districts that increased their wages. In summary, strong evidence exists that wages can be effective in attracting teachers.

## **VI. Conclusions: The Current and Potential Role of Salary Policies**

The impact of the current system of salary schedules on the distribution of teachers is not a simple story. On average, after adjusting for differences in wages related to the

proportion of students on free or reduced-price lunch, districts with high proportions of black and Hispanic students tend to pay higher salaries, but they have less qualified teachers. The current system may thus reduce the inequities in teacher resources created by teacher preferences and teacher sorting across districts. These wage premiums, however, appear not to be great enough to compensate for adverse working conditions, given the lesser qualifications of teachers in these schools. In addition, high-poverty schools and New York City schools have both lower wages and less qualified teachers. Wages in these cases exacerbate inequities.

Importantly, a large part of the variation in teacher qualifications is not among districts but among schools within the same district.<sup>8</sup> Salary schedules are set at the district level and thus currently do not influence within-district sorting. Wage policies aimed at addressing within-district inequities will need to break the tradition of equal salary schedules within districts by providing additional funding to schools that are difficult to staff.<sup>9</sup>

In this paper I have examined the disparities in teachers across schools and the potential role for targeted salary increases in alleviating these disparities. I started by looking at the current distribution of teachers in New York State and asking whether the differences that we see across schools in average teacher qualifications are systematically related to characteristics of schools such as urban status and the demographic composition of the student body. I find:

- Large variation in teacher qualifications across districts. On average, districts with a higher proportion of black students, Hispanic students, and students in poverty have less qualified teachers. Urban districts also tend to have less qualified teachers than rural and suburban districts.
- Large variation in teacher qualifications among schools within the same district. Again, schools with a higher proportion of black students, Hispanic students, and students in poverty have less qualified teachers.
- Variations in teacher qualifications across regions of New York State and across metropolitan areas in the U.S. are not as great as the variation within these regions.

I then identified forces contributing to the disparities in teacher qualifications across schools and discussed whether or not these disparities are likely to reflect actual differences in teacher skills. I conclude:

- The disparities across schools in teacher qualifications are likely caused by teacher preferences for certain types of students and certain types of schools,

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<sup>8</sup> It may even be among classes within the same school. I am unable to address this in this paper.

<sup>9</sup> A similar argument applies to difficult-to-staff subject areas within schools. Establishing differential wages for teachers in these subjects is likely to be an effective policy tool for alleviating shortages.

although differences across districts in the efficiency of their hiring practices may contribute as well.

- Given the strength of the teacher qualification measures available for teachers in New York State and the strong correlation in average teacher characteristics across schools, differences that we see in teacher qualifications are likely to reflect differences in teacher quality.

The fourth section of the paper addressed the current distribution of teacher salaries in New York State. It finds:

- Most of the variation in both starting salaries and salaries for experienced teachers occurs among regions of the state, not among districts within the same region. Similarly, across the country most of the variation in wages is across metropolitan areas, not among districts within the same metropolitan area.
- However, the salary differences that do exist among districts within a region appear to be economically substantial enough to influence behavior.
- Salary schedules differ not only in the level of the starting salary but also in the wage gain with years of experience. New York districts have high returns to experience (back-loading of the salary schedule) compared to the rest of the country. Among districts in the state, those in the Syracuse area, in the Southern Tier region, and in the North Country region tend to have lower returns to experience than those in the rest of the state, returns that are closer to national norms.
- Salaries in the state vary systematically with characteristics of the schools. Within regions, districts with a higher proportion of children in poverty tend to pay lower salaries. Adjusting for the poverty differences, districts with a higher proportion of black or Hispanic students tend to offer higher salaries. The New York City School District pays lower wages than surrounding districts.

In Section V, I reviewed what we know from existing research about the impact of salaries on teacher choices and student outcomes. The findings that stand out are:

- Teachers are influenced by wages in decisions to pursue a teaching career, in decisions to transfer, and in decisions to quit.
- Increased wages, across the board, are likely to increase the pool of available teachers. Effective hiring practices are essential for translating this increased pool into a higher-quality teacher workforce.

- Increased salaries in a single district are likely to attract teachers to that district. Again, effective hiring practices are essential for translating this increased pool into a higher-quality teacher workforce.

Large inequities in teaching resources exist among schools in New York State and in the rest of the U.S. Across-the-board increases in salaries may attract more high-quality college graduates into teaching and may be beneficial to students in the long run, but they are not efficient policies for addressing disparities across schools. Teachers have preferences and these preferences create disparities. Teachers appear, on average, to prefer high-performing schools with few children in poverty. In order to attract teachers to other schools, policies need to create incentives that balance off these preferences. A targeted wage increase is one such incentive.

We do not know whether targeted increases are the most efficient means for addressing the differentials. We know very little about the impact of alternative policies. Regulations or policies that attempt to force teachers to teach in schools without sufficient compensation are likely to fail. Teachers may simply quit. In addition, targeted increases are likely to be considerably more efficient than across-the-board increases that will affect overall quality but will not address disparities across schools. Nevertheless, there may be feasible alternatives.

Expenditures on facilities or teaching supplies may attract teachers at a lower cost than wage increases.<sup>10</sup> For example, it may be more efficient in terms of attracting and retaining high-quality teachers, for a school to spend an additional \$50,000 improving facilities or providing safe and accessible parking, than it would be to increase each of 50 teachers' salaries in the school by \$1,000. Further research into the effect of resource allocations and non-wage school characteristics on teacher choice would help inform effective policy development. In addition, local school officials may be able to judge the relative benefits of different approaches. However, given our current knowledge, there is no reason to believe that targeted wage increases would not help to bridge the gap in teacher qualifications across schools.

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<sup>10</sup> Similarly, districts may be able to increase teacher quality by trading off higher returns to experience for higher starting wages, though this may be difficult politically. The final column of table 4 gives some suggestion of this possibility in that a dollar increase in starting salaries coincides with twice as great an increase in teacher qualifications as does a dollar increase in the premium to 20 years' experience.

**Figure 1: Distribution of Teacher Characteristics across Schools**

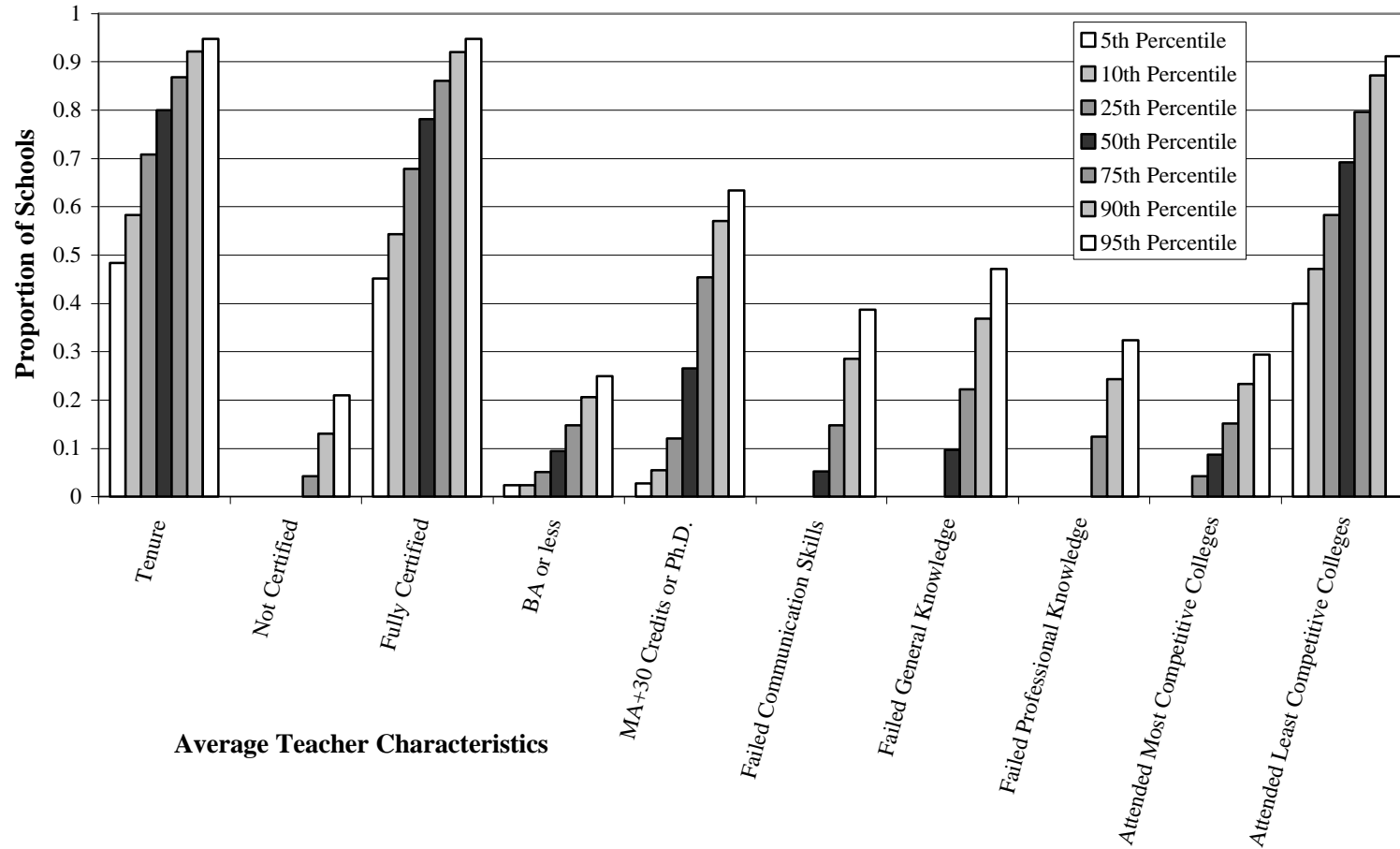




Figure 2: Average Teacher Characteristics by Urban Status

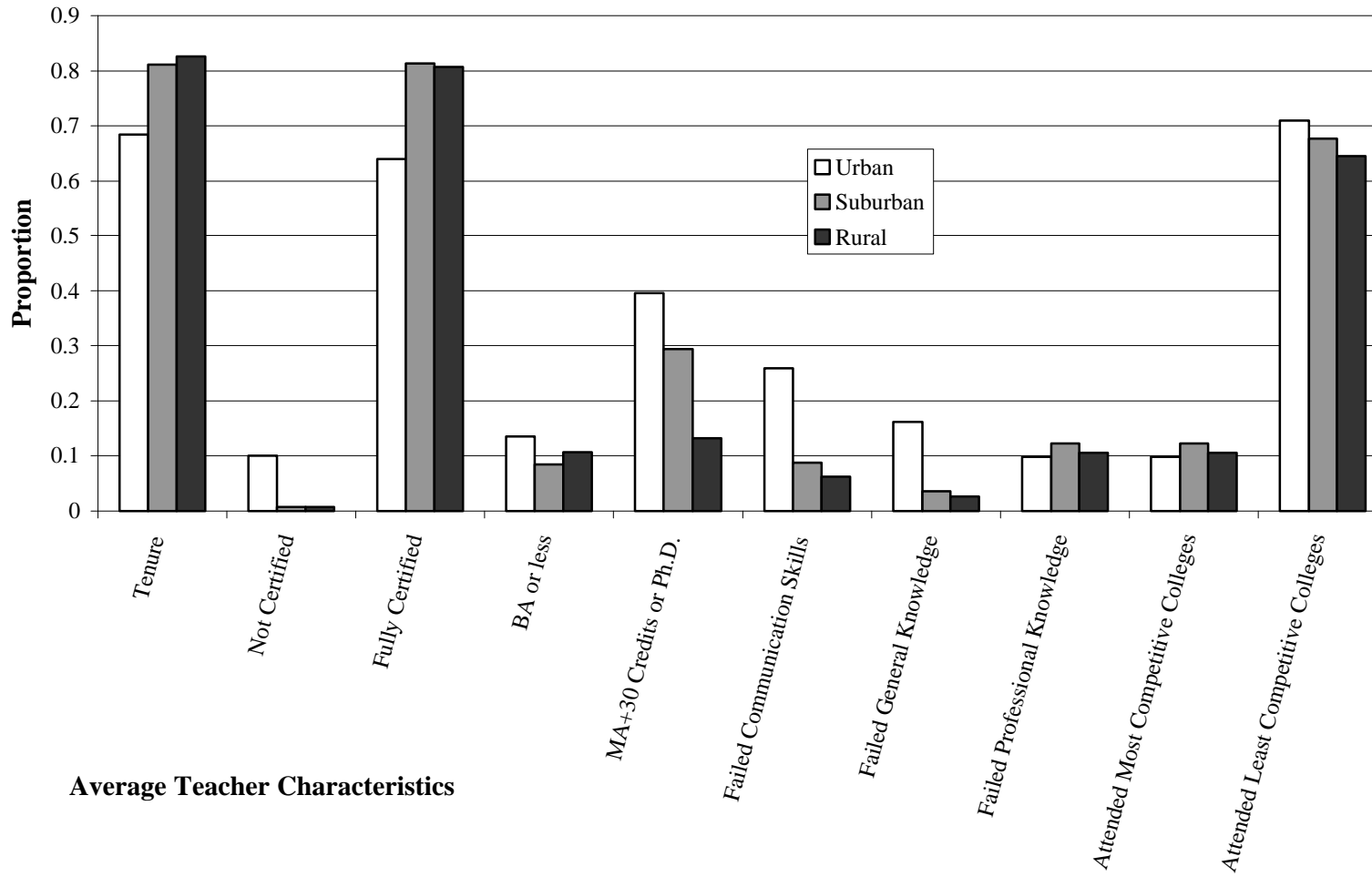
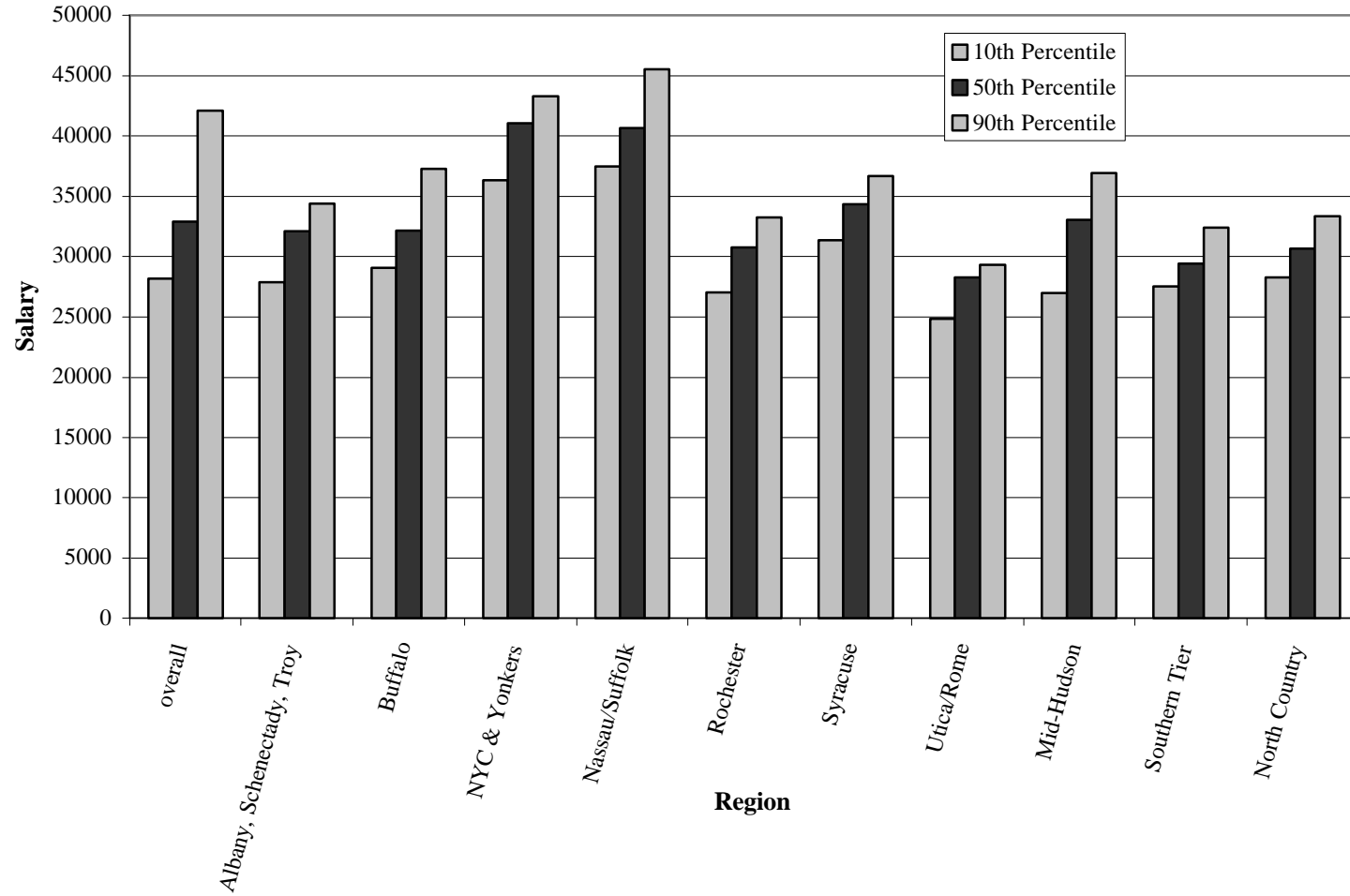
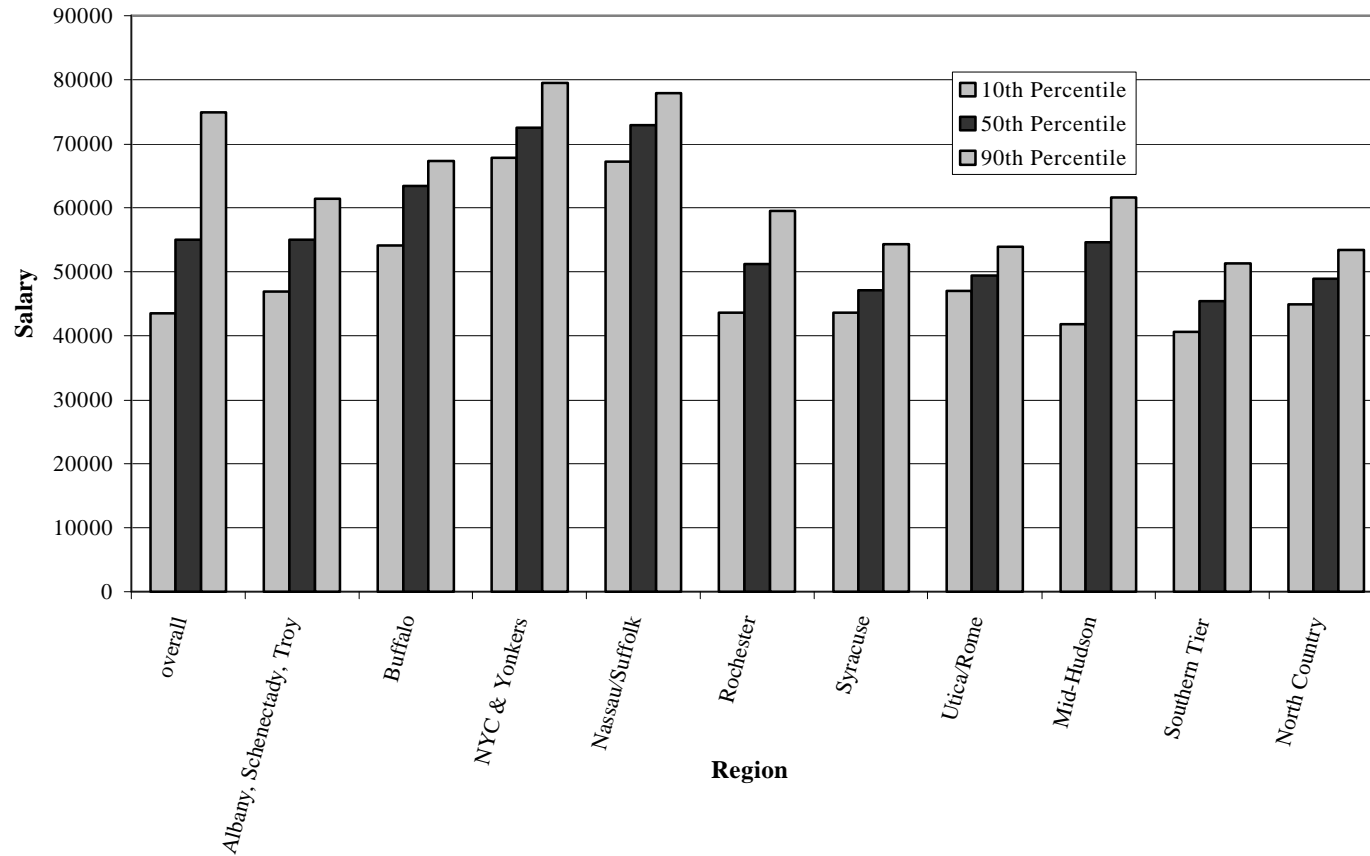


Figure 3a: The Distribution of Starting Salary Overall and Within Ten Regions of New York State



**Figure 3b: The Distribution of Salary for Teachers with 20 Years' Experience  
Overall and within Ten Regions of New York State**



**Table 1a**  
**The Relationship Between Teacher Qualifications and Student Demographics\***  
**OLS Regressions**

	School Level			District Level	
Urban	-0.549 (0.064)	-0.229 (0.114)		-0.091 (0.100)	-0.329 (0.124)
Suburban	-0.055 (0.042)	0.218 (0.102)	0.263 (0.803)	-0.119 (0.035)	-0.316 (0.096)
Percent Black	-1.267 (0.075)	-1.102 (0.077)	-1.684 (0.127)	-0.586 (0.152)	-0.406 (0.156)
Percent Hispanic	-1.796 (0.086)	-1.486 (0.093)	-1.935 (0.133)	-1.019 (0.223)	-0.482 (0.251)
Percent Asian	0.251 (0.183)	0.661 (0.186)	0.252 (0.274)	0.062 (0.415)	0.422 (0.414)
Percent Poverty				-0.214 (0.097)	-0.439 (0.110)
Fixed Effects	no	Region	District	no	Region
R-Sq	0.674	0.689	0.780	0.265	0.327

\* Standard errors in parentheses

**Table 1.b**  
**The Relationship between**  
**Average General Knowledge Score and Student Demographics\***  
**OLS Regressions**

	School Level			District Level	
Urban	-2.915 (0.323)	-2.402 (0.630)		-1.585 (0.764)	-2.092 (0.904)
Suburban	-1.421 (0.199)	-0.479 (0.583)	-2.258 (5.788)	-1.231 (0.269)	-1.366 (0.680)
Percent Black	-5.734 (0.404)	-4.765 (0.417)	-5.970 (0.629)	-4.382 (1.708)	-3.563 (1.179)
Percent Hispanic	-8.639 (0.469)	-6.595 (0.521)	-6.431 (0.681)	-7.157 (1.708)	-4.190 (1.892)
Percent Asian	0.163 (0.954)	3.072 (0.995)	2.649 (1.234)	3.251 (0.744)	6.087 (3.116)
Percent Poverty				-0.599 (0.744)	-1.851 (0.834)
Fixed Effects	no	Region	District	no	Region
R-Sq	0.341	0.362	0.366	0.253	0.337

\* Standard errors in parentheses.

**Table 1.c**  
**The Relationship between Percentage Fully Certified and Student Demographics\***  
**OLS Regressions**

	School Level			District Level	
	Urban	-0.070 (0.008)	-0.029 (0.016)		0.006 (0.020)
Suburban	0.017 (0.005)	0.050 (0.015)	0.049 (0.146)	0.012 (0.007)	0.022 (0.020)
Percent Black	-0.124 (0.010)	-0.105 (0.011)	-0.209 (0.016)	-0.033 (0.031)	0.018 (0.033)
Percent Hispanic	-0.208 (0.012)	-0.176 (0.014)	-0.269 (0.017)	-0.084 (0.045)	0.015 (0.052)
Percent Asian	0.126 (0.025)	0.172 (0.026)	0.091 (0.031)	0.051 (0.085)	0.096 (0.086)
Percent Poverty				-0.029 (0.020)	-0.080 (0.023)
Fixed Effects	no	Region	District	no	yes
R-Sq	0.353	0.364	0.416	0.061	0.118

\* Standard errors in parentheses.

**Table 2**  
**The Distribution of Salary Increases between 0 and 20 Years' Experience**

	Overall	Albany Schenectady Troy Region	Buffalo Region	NYC Yonkers Region	Nassau Suffolk Region	Rochester Region	Syracuse Region	Utica Rome Region	Hudson Region	Southern Tier Region	North Country Region
<b>Dollars</b>											
10th Percentile	13143	15143	21081	24942	25852	13516	9664	18727	13143	10822	14587
Median	23031	24370	29505	32756	32098	20517	12622	22375	21568	15163	17571
90th Percentile	34310	29704	37533	37230	36860	29144	22302	27361	27967	21860	22655
<b>Ratio:</b>											
<b>20 years to 0 years</b>											
10th Percentile	1.43	1.48	1.62	1.59	1.59	1.45	1.26	1.66	1.44	1.34	1.45
Median	1.69	1.77	1.87	1.79	1.75	1.71	1.39	1.79	1.63	1.51	1.56
90th Percentile	2.02	1.97	2.27	1.99	1.99	1.90	1.64	2.10	1.85	1.78	1.77

**Table 3**  
**Regressions of Salary on Student Demographics\***  
**OLS Regressions**

	Starting Salary		20-Year Salary		Difference		Ratio	
	Urban	-1156 (1260)	-2474 (1215)	2856 (2448)	4674 (2149)	4012 (2036)	7148 (2056)	0.164 (0.066)
Suburban	1137 (444)	-2831 (914)	4879 (863)	3294 (1616)	3743 (717)	6125 (1547)	0.103 (0.023)	0.291 (0.054)
Percent Black	11980 (1927)	4784 (1585)	24343 (3744)	8343 (2803)	12363 (3113)	3559 (2682)	0.122 (0.101)	0.037 (0.094)
Percent Hispanic	1927 (2817)	6766 (2549)	54275 (5473)	13481 (4508)	28199 (4552)	6715 (4313)	0.247 (0.147)	0.074 (0.152)
Percent Asian	28195 (5251)	10452 (4191)	46342 (10201)	19235 (7409)	18147 (8483)	8783 (7090)	-0.102 (0.274)	0.044 (0.249)
Percent Poverty	-14145 (1227)	-6056 (1121)	-33672 (2384)	-15718 (1983)	-19528 (1982)	-9662 (1897)	-0.272 (0.064)	-0.175 (0.067)
Fixed Effects	no	Region	no	Region	no	Region	no	Region
R-Sq	0.545	0.731	0.632	0.820	0.450	0.644	0.155	0.354

\* Standard errors in parentheses.

Note: 72 percent, 79 percent, 62 percent, and 35 percent of the variance in starting salary, 20-year salary, the difference and the ratio, respectively, are due to differences across regions.



**Table 4**  
**Regressions of Average Metropolitan Area Wage on Non-Teacher Salaries**  
**with and without Controls for District Characteristics, National Sample**

Average Salary of Working Women College Graduates	0.4646 (0.0787)	0.3426 (0.0799)
Average Salary of Working Men	0.0434 0.0520	0.0510 0.0528
R-Sq	0.372	0.257
Outcome is adjusted for district characteristics*	No	Yes

\* These include enrollment, percentage nonwhite students, percentage students in poverty, percentage at-risk students, percentage of district with a high school degree, percentage with some college, percentage with a college degree or more, the percentage proficient in English, median income, and median house value.

**Table 5**  
**Regressions of Teacher Qualifications on Salary and Student Demographics\***

Starting Salary (in thousands)	-0.0037 (0.0038)	0.0098 (0.0048)	0.0121 (0.0049)
Difference (in thousands)			0.0062 (0.0029)
Urban	-0.095 (0.100)	-0.306 (0.120)	-0.436 (0.133)
Suburban	-0.114 (0.035)	-0.289 (0.091)	-0.411 (0.088)
Percent Black	-0.542 (0.159)	-0.453 (0.157)	-0.486 (0.157)
Percent Hispanic	-0.923 (0.244)	-0.549 (0.252)	-0.605 (0.252)
Percent Asian	0.165 (0.429)	0.320 (0.413)	0.242 (0.413)
Percent Poverty	-0.266 (0.111)	-0.379 (0.114)	-0.306 (0.118)
Fixed Effects	no	Region	Region
R-Sq	0.277	0.334	0.339

\* Standard errors in parentheses.

Note: 72 percent, 79 percent, 62 percent, and 35 percent of the variance in starting salary, 20-year salary, the difference and the ratio, respectively, are due to differences across regions.

**Appendix Table 1  
Components of the Teacher Quality Measure  
(Eigenvalue 9.31)**

Variable	Scoring Coefficients	Factor Loading
Average First score on		
NTE communication skills exam	0.15079	0.90532
NTE general knowledge exam	0.08179	0.84798
NTE professional knowledge exam	0.13862	0.89318
NYSTCE Liberal Arts and Sciences Test	0.13482	0.85983
NYSTCE Assessment of Teaching Skills - Elementary	0.07051	0.69564
NYSTCE Assessment of Teaching Skills – Secondary	0.06195	0.64823
% Failed of those who took exam		
NTE communication skills	-0.07191	-0.84478
NTE general knowledge exam	-0.07935	-0.82998
NTE professional knowledge exam	-0.05405	-0.81364
LAST	-0.08635	-0.83047
ATS-elementary	-0.05479	-0.63838
ATS-secondary	-0.04137	-0.55636
% attended Colleges with the following Barron’s ratings**		
most competitive or highly competitive	-0.00531	0.25912
very competitive	0.00819	0.33059
competitive	-0.00595	0.16904
% of teachers with tenure	0.06406	0.60311
% of teachers with the following educational attainment**		
BA or less	-0.02104	-0.49063
MA	0.02688	0.4772
% with the following certification**		
not certified in any subject taught	-0.03924	-0.6733
permanently certified in all subjects taught	0.09264	0.6048

\* All measures are at the district level

\*\* Omitted groups: non competitive, MA + 30 credits or Ph.D., and provisionally certified or certified but not in all subjects taught.

Note: The factor accounts for 65 percent of the variation in the component variables.

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