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Initial Matches, Transfers, and Quits: Career Decisions and the Disparities in Average Teacher Qualifications Across Schools

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Abstract: Utilizing a unique dataset that follows the careers of *all* New York State public school teachers over the past twenty years, this paper asks: what is the typical career path of a teacher? How do career paths differ across schools and across teachers with different characteristics? And how do career paths contribute to the observed distribution of teachers across schools? Like other studies we find substantial turnover of teachers in the first few years of teaching. We find that some relationships have been quite stable over time, such as higher quit rates of teachers from more selective colleges. However other relationships have changed including the age of entry into teaching and the quit rates in urban vs. suburban schools. Our results demonstrate the importance of the initial matching of teachers to schools in determining the distribution of teacher qualifications across schools both within regions and between regions and the importance of transfers in the disparities within regions. While quit behavior sometimes contributes to the systematic differences it is of secondary importance.

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I. Introduction

Demographic trends and education policy choices are increasing the need to attract and retain high-quality elementary and secondary school teachers. While many schools need to attract new skilled teachers, some schools face exceptional problems in this endeavor. In New York State, for example, close to a third of schools have no teachers who have failed teacher certification exams, while in another ten percent of schools more than 30 percent of teachers who have taken the exams have failed. Urban schools, on average, have less qualified teachers than suburban and rural schools; and schools with lower performing students have, on average, less qualified teachers than those with higher performing students (Lankford, Loeb, Wyckoff, 2002). A clear understanding of the career paths of teachers can help in the design of effective policies for addressing these disparities. For example, policies that target the initial match of teachers to schools may not be effective if much of the sorting is due to transfer and quit behavior. Alternatively, policies that focus on teacher turnover may not be effective if the sorting occurs in the first teaching job.

The goal of this paper is to describe teacher career paths. Other studies have described teachers' careers. Hanushek, Kain and Rivkin (1999) and Kirby, Naftal and Berends' (1999) work in Texas, Murnane and colleagues work in Michigan and North Carolina (Murnane, 1981; Murane and Olsen, 1989; Murnane, Singer, Willett, Kemple and Olsen; 1991); Theobalds' (1990) work in Washington State, and Brewer's (1996) work in New York State are examples.[1] This study distinguishes itself by the focus on the role of career paths in creating the observed

[1] These are only a few examples from a large literature. Some additional examples are Bempah, Kaylen Osburn., & Birkenholz (1994) and Greenberg and McCall (1974) who look at mobility across school districts; and Greenberg and McCall (1974) who describe transfers within districts. Many of the studies address a single state. Boe et. al., (1999) use the Schools and Staffing Survey Teacher Follow-up Survey to study teacher turnover across the United States. The Baccalaureate and Beyond Longitudinal Study is an important new data source that has been used to describe a cohort of those entering teaching (see U.S. Department of Education, 1997, 2000) and could be used for a variety of multivariate analyses.

distribution of teachers across schools, by the breadth, depth and duration of the data, and by the techniques employed in describing teacher careers.

Our data comes from administrative records in New York State that allow us to follow *all* teachers in the state over the past 30 years. The breadth of the data (all teachers in all schools) allows analytical flexibility not possible with smaller datasets. For example, we can compare exit behavior of teachers in urban schools with those in suburban or rural schools. We can do this separately for each region in the state and we can do this separately by year of entry into the system. The length of the data allows us to follow teachers for up to 30 years. Thus, unlike most previous studies, we are able to describe both the behavior of recent entrants and that of teachers later in their careers. We can assess whether the behavior we observe is a recent phenomena or one that has persisted. The data is richer in its descriptions of teachers than other administrative datasets used to date, including teachers' test scores and undergraduate institution. In addition, it allows us to match teachers to characteristics of the schools in which they teach in a way that most national longitudinal surveys used for teacher career analysis, such as High School and Beyond or the National Longitudinal Survey of Youth, do not.

New York State faces trends in teacher demand similar to those faced across the United States. About 38 percent of New York's current teachers will have retired or reached age 55 within the next five years. Policies of accountability and class size reduction are also increasing demand for teachers in the State. Thus, while teacher labor markets vary across states, New York serves as a good example for examining the teacher workforce because of these trends and because it comprises a diverse population and a range of schools across which teachers can demonstrate their preferences.

The analysis addresses three general questions:

- What is the typical career path of a teacher?
- How do career paths differ across schools and across teachers with different characteristics?
- How do career paths contribute to the observed distribution of teachers across schools?

Like other studies we find substantial turnover of teachers in the first few years of teaching, especially for high ability teachers (as defined by test scores and undergraduate institution) in urban schools. Some relationships have been quite stable over time, such as lower quit rates for elementary school vs. secondary school teachers and the higher quit rates of teachers from more selective undergraduate institutions. However other relationships have changed during the past 20 years including the age of entry into teaching, the relative quit behavior of male and female teachers and the quit rates in urban vs. suburban schools. Finally, our results demonstrate the importance of the initial matching of teachers to schools in determining the distribution of teacher qualifications across schools both within regions and between regions and the importance of transfers in the disparities within regions. While quit behavior sometimes contributes to the systematic differences it is of secondary importance. In what follows, we start with a discussion of our data and methods. The third, fourth and fifth sections give results corresponding to our three research questions outlined above; and the final section draws policy implications and concludes.

II. Data and Methods

Data. Our database links seven administrative datasets and various other information characterizing districts, communities, and local labor markets. It includes information for every teacher and administrator employed in a New York public school at any time from 1969-70 through 1999-2000. The core data comes from the Personnel Master File (PMF), part of the Basic Education Data System of the New York State Education Department. In a typical year

there are more than 180,000 teachers identified in the PMF. We have linked these annual records through time, yielding detailed data characterizing the career history of each individual. Several other databases that contain a range of information about the qualifications of prospective and actual teachers, as well as the environments in which these individuals make career decisions, substantially enrich this core data.[2]

Methods. The methods used in this paper are primarily descriptive. For most of the analyses we use cohort-specific data sets for each year from 1969-70 through 1999-2000. These data sets contain information on each teacher who began teaching in New York State schools in the cohort year. We observe each teacher for each year he/she taught in New York State public schools.

Typical Career Paths: We first use these data to describe the typical career paths of teachers and how these have changed over time. We look specifically at:

- Age of entry,
- Teaching Transitions – in and out of teaching and among schools and districts,
- Specialty Transitions – in and out of subject areas,
- Movement into administration, and
- Attainment of additional education.

Differences in Career Paths By Teacher and School Characteristics: We then look more specifically at attrition and ask whether the decision to exit teaching in a particular school, a particular district, or the New York State System in general, differs for teachers with different characteristics, including:

- Gender,
- Competitiveness of undergraduate institution,
- Teacher certification exam performance,
- Subject specialization,
- Urban/suburban status,
- New York City Metro Area, and

[2] See Appendix A for a description of the administrative datasets that we have linked together for this analysis.

- School racial / poverty composition.

The Contribution of Initial Matches, Transfer,s and Quits to Inequities in Teacher Qualifications Across Schools: Previous studies have found high turnover rates and systematic differences in turnover across teachers with different characteristics. In particular, the career choices of teachers differ with their own education (Theobald, 1990), specialty field (Murnane et. al., 1989; Grissmer and Kirby, 1987; Ingersoll, 2001; Murnane et. al., 1991; Kirby et al., 1999; Darling-Hammond and Berry, 1999), cohort (Murnane, 1981), age (Grissmer and Kirby, 1987; Ingersoll, 2001; Murnane et. al., 1991; Kirby et al., 1999), and quality (Murnane et. al., 1991). In addition, we have some knowledge that school characteristics affect teacher turnover and differentially affect different types of teachers (Manski, 1987; Hanushek and Pace, 1995; Hanushek, Kain and Rivkin, 2001). However, we know little about the impact of these differences on the distribution of teachers across schools. In the final empirical section we examine the contributions of initial matches, transfers, and quits to the differences in average teacher qualifications observed across schools. We take each cohort of entering teachers from 1990 through 1995 separately and follow them through each year of teaching assessing the distribution of those teachers across schools in each year. This process allows us to incorporate all the differences in turnover rates by teacher and school characteristics and assess the importance of career paths on the disparities in teacher qualifications across schools.

III. Typical Career Paths:

Age of Entry: Teaching appears to be the first career for many entering teachers. In 2000, 61.5% of new teachers were less than 30 years old. However, many new teachers entered teaching until later. Figure 1a plots the age distribution for teachers who first started teaching in

New York State in 1999-2000 (the 2000 cohort) and had no previous teaching experience either in public or private schools. We see a spike in the mid-20s. Forty four percent of entrants were between 23 and 26 years of age. Yet, just over 16.5 percent were forty years of age or older when they started their first teaching job.

The age distribution for entering teachers in 2000 represents a substantial change from earlier cohorts. Figure 1b plots the age distribution for each cohort from 1970 through 2000. We see that in the early 1970s approximately 80 percent of entering teachers were less than 26 years old. This percentage dropped rapidly in the late seventies and early eighties. By 1986 less than forty percent of new teachers were 26 years of age or less. Similarly, in 1970 only 4.2 percent of new teachers were in their 30s and 3.0 percent were in their 40s. By 2000 these numbers had changed to 22.9 percent and 11.5 percent, respectively.

Are these older entrants more qualified than younger teachers? When we compare the test performance and competitiveness of their undergraduate institution, we find that they are not (Table 1). On average new teachers over thirty years of age are substantially more likely to have failed their Liberal Arts and Science exam than are younger entrants. For the 2000 cohort, for example, 14.4 percent of entrants who were 30 years of age or older had failed this teacher certification exam at least once, compared with 7.9% of those under 30. This disparity is consistent across the 1995-2000 cohorts. Some of the test-score gap may be due to the older group's lacking practice with test taking. However, we find similar disparities between younger and older first year teachers in the competitiveness of the undergraduate institution attended. In 2000, 13.5 percent of entrants under thirty had graduated from highly competitive colleges, compared with 10.0 percent of the older hires. Thirteen percent of young hires had attended least competitive colleges, compared with 19.1 percent of older hires. We also see that younger

entrants are somewhat more likely to teach in suburban and rural settings, though these effects are not as consistent as the ones for teacher qualifications.

Transitions In and Out of Teaching and Among Schools and Districts: Many teachers leave teaching after their first year, but a similarly large proportion stay in teaching for a substantial amount of time. For the cohort of teachers who began teaching in 1990, 13.6 percent left after their first year. Another 14.3 percent left by the end of their third year; and another 22.8 percent left by the end of their tenth year. However, this implies that almost 50 percent of beginning teachers teach for more than 10 years. This persistence is substantially greater than it has been in the past. For the 1975 cohort, for example, only 33.1% of teachers taught for more than 10 years. Twenty six percent left after only one year and another 18.1 percent left by the end of their third year. For a more complete picture of teachers' exit behavior, Figure 2 graphs the empirical survival functions for the 1970, 1975, 1980, 1985, 1990 and 1995 entering cohorts. We see a shift up in the survival functions over time, indicating that teachers are less likely to exit now than they were in the past. The most dramatic changes occurred in the late 1970s and early 1980s; but the trend toward longer teaching careers continues recently. Of the 1995 cohort, for example, 22.8 percent left by the end of their third year, compared with 28.0 percent of the 1990 cohort.

During their tenure in teaching, some teachers teach in only one school, some move to multiple schools within the same district and some switch districts. Table 2 summarizes this behavior over time by recording the percent of teachers in each cohort who, during their first 10 years teaching, (a) taught in multiple districts, (b) taught in only one district but in multiple schools and (c or d) taught in only one school. We divide teachers teaching in only one school into those with greater than three years of total teaching and those with less than or equal to three

years of total teaching in order to separate those who stay in one school for a substantial period of time from those who teach in only one school because of a short career in teaching. The table shows a fairly even distribution across our four groups. Of teachers who began their careers in 1990, 26 percent taught in multiple districts during their first ten years. Thirty percent taught in multiple schools within the same district. Only 21 percent taught in the same school for more than three years. In the early 1980s there appears to have been higher transfer rates between districts. A higher proportion of teachers taught in multiple districts and a smaller proportion taught in a single school. Other than that, these career patterns have been fairly stable over time.

Tables 3a-3c give a more complete picture of teachers' transitions. Table 3a records the number of times a teacher enters the New York State system, the number of consecutive years she/he spends teaching after entering the system, and the number of years between consecutive teaching spells. For example, we find that 70.5 percent of teachers have only one spell in the New York State system. That is, once they start teaching, if they leave teaching, they do not return. Twenty-two percent have two teaching spells; six percent have three teaching spells and the remaining one percent have more than three spells. Those teachers that have only one spell of consecutive teaching, average 13.1 years of teaching. Those that have two spells, average five years in their first spell and 11.4 years in their second spell. Their average time out of the system between teaching spells in 5.8 years.[3] The numbers in Table 3a are based on starting teachers from the 1969-70 through the 1995-1996 academic years. Because we do not observe the full career paths of teachers, we have right-hand-censoring. For example, since we only observe five years of teaching for the 1995 cohort, we may underestimate the number of times these teachers teach in New York State and the length of time in their last teaching spell. This truncation would

[3] While we have gone to great effort to correctly classify entry and exit into the New York State system, there may be some cases in which a teacher does not fill out a form in one year, even though he/she is teaching and that leads us to misclassify him/her as leaving. This would bias down our estimates of the number of years in a spell.

lead us to underestimate these figures. For those numbers where truncation is a problem, we limit our analysis to the 1970 through 1975 cohorts. These are presented in bold and the censored numbers based on the full sample appear in parentheses. Three results are worth particular note. First, most teaching careers are stable. Only a few teachers move in and out of teaching. Second, most of those that do move in and out appear to transition early in their careers, as evidenced by the shorter length of the teaching spells before the final teaching spell. For example, teachers who have two spells tend to have a longer second spell. Teachers who have three spells tend to have a longest third spell. A final description of note is that teachers who take time away from teaching tend to stay out for a substantial number of years. The average time away from teaching for those having a single break in service is 5.8 years.

Table 3b gives similar results for district transitions during a teacher's first spell in the New York State public school system (as noted above approximately 70 percent have only one spell). Here we see that most of these teachers (61.7 percent) work in only one district and of those that work in multiple districts, most work in only two (23.9 percent). Again we see that teachers spend the most time in the last district that they teach in. The 23.9 percent of teachers who teach in two districts during their career spend an average of 4.4 years in their first district and 11.3 years in their second district. This trend is consistent with a model in which teachers search for a good job match and then stay.

Similar results for schools appear in Table 3c. While the majority of teachers teach in only one or two schools, slightly more than 20 percent of teachers teach in five or more schools during their teaching career. Again, we see evidence that teachers transition between schools until they find one in which they want to stay. A teacher who teaches in three schools during his/her career, for example, spends an average of 3.9 years in the first school, 3.0 years in the

second school and 8.8 years in the third school. A teacher who teaches in four schools during his/her career spends an average of three years in each of the first three schools and eight years in the forth and final school.

Transitions Across Subject Specialties: Teachers may transition not only across schools and districts but also across teaching fields. To characterize these transitions we took the 1990 cohort of entering teachers, selected only those teachers who acquired at least seven years of teaching experience within our sample period, and identified the field in which they were teaching during their third teaching year and during their seventh teaching year. We choose the third year instead of the first year so that teachers would have a chance to settle in a position. We characterized subject field narrowly, classifying teachers only if they spent at least 70 percent of their teaching time in that subject area. We classified teachers who spent less than 70 percent of their time in all subjects as "mixed." We then created a matrix, given in Table 4a, that matches teaching field in year three with teaching field in year seven. We find substantial consistency. Eighty eight percent of middle and high school science teachers as defined in year three were still teaching science during their seventh year. The least consistent field is fine arts. Of those teachers spending at least 70 percent of their teaching time in fine arts during their third year, 66.2 percent were still spending at least 70 percent of their teaching time in fine arts during their seventh year. The vast majority of those who were not still in fine arts, were mixed, indicating that they did not spend more than 70 percent of their time in any single subject. This consistency is evident over longer periods of time as well. In Table 4b we present similar results for the 1980 cohort of starting teachings, comparing year-three subject area with year 20 subject area. Eighty two percent of elementary teachers are still in elementary schools. Approximately

75 percent of math, science and humanities teachers are still teaching the same subject 17 years later.

Movement into Administration: In addition to moving across teaching fields, teachers may move in and out of administration. Table 5 describes this behavior for the cohort of administrators in 1995. We see that administrators tend to have substantial experience in the New York State education system prior to their administrative jobs. On average superintendents have 18.9 years of experience, and principals have 16.1 years. Even subject administrators have an average of 12.4 years of experience. Only a small proportion of teachers ever become administrators. Of teachers who acquire at least 10 years of experience, only 0.6 percent become superintendents, one percent become assistant superintendents, 4.5 percent become principals and 5.9 percent become assistant principals. More than ten percent of these teachers do serve in some administrative capacity, primarily subject administration at the building level.

Attainment of Additional Education: During their careers in New York State, many teachers acquire a Masters Degree. For example, 48.3 percent of teachers who began teaching in 1970 obtained a Masters Degree during their teaching career. On average, these teachers obtained these degrees after teaching for approximately 11.2 years. An additional eight percent entered teaching with an MA degree. As described in Table 6, these numbers have changed for recent cohorts. Many more teachers have Masters when they first enter teaching, and those who do not, obtain them far earlier in their careers. Thirty eight percent of teachers who started in 1995 came in with a Masters degree. The 35 percent who went on to get Masters after entering did so in an average of 3.4 years. These changes are likely to have been driven by the requirement of a Masters degree for permanent certification in New York State and by the aging of the entering cohort (in 1999-2000, 27 percent of entrants under 30 had a masters coming in,

compared with 50 percent of those 30 and over); but also represent an increase in higher education degree among teachers throughout the United States.

IV. Variation in Career Paths By Teacher and School Characteristics

The 1990 Cohort of Entering Teachers: Teachers differ in the characteristics they bring with them to teaching and the types of schools in which they teach. How do the exit behaviors of teachers differ depending on these characteristics? To begin we look at the 1990 cohort of entering teachers. Table 7 summarizes differences in exit behavior by age of entry, gender, the competitiveness of undergraduate institutions, and passage of teacher certification exams. After the first year, there is little difference in the exit rates of teachers by age. Thirteen percent of both groups have left the system and 32.6 percent of both groups have left their first school. However by the end of ten years, younger entering teachers are more likely have left the system: 53.5 percent, compared with 45.4 percent of older entering teachers. This is consistent with Kirby's (1997) analysis of Texas teachers and is likely not specific to teaching. Younger workers, on average, are more mobile across professions.

Male teachers are more likely to leave teaching after their first year, and within their first three years of teaching, than are female teachers. They are also more likely to leave the particular school and district that they first enter. By the end of three years, 60 percent of males had left their first school, compared with 53.1 percent of females. Thirty one percent of males had left teaching altogether compared with 25 percent of females. As are almost all the differences described, these differences are significant at the ($p<.001$) level. However, by the end of ten years, gender differences are no longer evident. Eighty two percent of male teachers

have left their original school compared with 80 percent of female teachers; 49.4 percent of male teachers had left the New York State system, compared with 49.6 percent of female teachers.

Teachers from highly competitive colleges are more likely to leave teaching than are teachers from other colleges. By the end of ten years, 55 percent of these teachers had left the system, compared with 45 percent of other teachers. These distinctions also are evident for teachers who passed and failed the Liberal Arts and Science Certification exam or the General Knowledge Certification Exam. Six point three percent of teachers who failed these exams left after the first year, compared with 13.8 percent of those who passed. By the end of ten years, 45.3 percent of those who failed had left, compared with 50.3 percent of those who passed.

Elementary teachers are less likely to switch schools, switch districts, or exit the New York State system than are secondary school teachers. Figure 3a illustrates this difference. However, among secondary school teachers there appears to be little difference in exit behavior across the disciplines. By the end of ten years, 50.2 percent of humanities teachers had left, compared with 49.2 percent of Math and Science teachers and 52.6 percent of special education teachers. 46.8 percent of elementary school teachers had left by this time.

We find differences in exit behaviors across urban and suburban schools, both within the New York City Metropolitan area and in the rest of the state. As shown in Figure 3b, teachers that start in urban schools are more likely to leave teaching. By the end of ten years, 54.6 percent of teachers in urban New York City schools had left the system, compared with 46.8 percent of teachers in suburban schools in the New York City metropolitan area (including Westchester and Long Island). For the rest of the State the numbers are 49.8 percent and 42.3 percent for urban and suburban teachers respectively. These differences are more dramatic when we cut the data by the competitiveness of undergraduate institution. Figure 3c shows that

both urban and suburban areas in the New York City Metropolitan Area and around the State, have a more difficult time retaining teachers from more competitive institutions. However, the difference in New York City urban schools is most dramatic. Thirty three percent of urban new York City teachers from competitive colleges left the system by the end of three years, compared with only 22 percent of those from less competitive colleges.

Differences over Time: Some of the differences in exit behavior apparent in recent cohorts are consistent with previous years, however, some changes over time are also evident. Figure 4a plots by gender the percent of teachers who exited schools, districts, and the state by the end of their third year for the 1970 through 1995 cohorts. We see that prior to the early 1980s females were more likely to exit than males at all levels. This switched in approximately 1983 and since then, males are more likely to exit. In contrast, at least since the mid-1980s, teachers from more competitive undergraduate institutions consistently have been more likely to leave schools. In Figure 4b, we see little change in the relative quit behavior of these groups. Similarly, the difference between elementary teachers and those in middle and secondary schools emerged in the late 1970s and has been similar since.[4] Figure 4c plots 3 year moving averages for New York City and the rest of the State by urban and suburban. We see a large peak for New York City Urban schools in the mid-1970s. We also see a substantial decrease in the quit rate over the past 20 years for teachers outside of New York City urban schools. The quit rate in New York City urban schools has remained constant at least for the past 10 years. Note, however, that New York City has not always had higher turnover rates. From the late 1970s through the mid-1980s, these rates were lower in New York City urban schools than in the rest of the state.

[4] Figure available from the authors upon request.

V. The Relative Importance of Initial Matches, Transfers and Quits

So far this analysis has evidenced substantial turnover during the first years of teaching, though a considerable group of teachers remain teaching for extended periods of time. In addition we have found differential quit rates by teacher and school characteristics. How important are these differences in exit behavior in explaining the disparities in the qualifications of teachers across schools? They may be key to the disparities or, alternatively, of secondary importance compared to the sorting of teachers to schools in their first job. To answer this question we first look at the importance of initial matches in comparison to quits and transfers in the distribution of teachers across regions and urban and suburban areas. In particular we consider the sorting of teachers among four areas: New York City metropolitan area urban schools, New York City metropolitan area suburban schools, other urban schools and other suburban schools. We then address the sorting within New York City across schools based on the percent of black or Hispanic students in the school and on the percent of students scoring at the lowest level on the fourth grade test of mathematics.

In order to distinguish the gap in average teacher quality due to initial matches from that due to quits and transfers, we take a cohort of entering teachers and assess the spread of teacher qualifications across groups in the first year and then in each following year for that same cohort. Figure 5 plots this for the 1995 cohort of entering teachers based on the percent of teachers who failed a certification exam. The figure shows substantial differences in the proportion of teachers who failed across the four regions (New York City urban schools, New York City suburban schools, other urban schools and other suburban schools) in 1995, the first year of teaching. On initial match New York City urban schools had 17.1 percentage points more teachers who had failed than non-NYC suburban schools. This difference had increased by 5.2 points by the end

of six years, implying that the initial match accounted for 77 percent of the disparity after six years, when most transfers had already taken place $\left(.77 = \frac{17.1}{5.2 + 17.1}\right)$. While the exit behavior exacerbates the disparities, the effect of exits are not as great as the disparities caused by the initial match. This finding holds across other measures of teacher qualifications and across other cohorts. Table 8 shows that averaging from 1990 through 1995 65.7 percent of the difference between urban New York City and schools in suburban areas outside of New York City in the percent of failing teachers is due to the initial match of teachers to schools. The corresponding averages for the percent of teachers from least competitive colleges and highly competitive colleges are even higher, 91 percent and 83 percent.

So far the comparison has been between initial matches on one hand and quits and transfers together on the other hand. In order to parse out transfers from quits, the fourth column of Table 8 reports corresponding gaps for those teachers who remain in teaching for the six years, thus eliminating those teachers who quit during this time period. Using this gap, the final two columns report the percent of the disparities due to transfers and the percent due to quits. For differences in the percent of teachers who failed a certification exam, both transfers and quits contribute to the disparities but transfers are more important relative to quits. Quits are somewhat more important than transfers for the percent of teachers from least competitive undergraduates, but neither of these mechanisms are nearly as important as the initial match. For the percent from highly competitive colleges, transfers actually lessen the disparities between schools, though again initial matches dominate.

The finding that the initial match accounts for most of the differential in teacher qualifications across regions helps us understand why some districts have substantially more qualified teachers than others, but does not necessarily provide a good perspective on how to

improve the quality of teaching in high-need, low-performing schools. We know from other research that teacher labor markets are geographically small and that a disproportionate share of teacher transfers are within district, rather than between districts. For example, more than 80 percent of applicants to the State University of New York who become teachers take their first teaching job within 40 miles of where they attended high school (Boyd, Lankford, Loeb and Wyckoff, 2002). As such, we would expect that the initial match would account for much of the differential in teacher qualifications, as it reflects differences in the characteristics of the local pool of students, which are known to vary widely. Additionally, in the New York City region, more than 75 percent of all transfers within the first six years of a teacher's career are transfers to a different school within a district, with between district transfers accounting for fewer than 25 percent (Lankford, Loeb and Wyckoff, 2002). This in combination with the small geographic nature of teacher labor markets suggests that we should examine the determination of teacher qualifications within districts.

Within districts the contributions of initial match and exits are roughly equal in determining the overall qualifications of teachers. We examine within region sorting among New York City urban schools based on the quartiles of the percent of fourth grade students who failed the New York State English Language Arts exam and the percent of Black and Hispanic students. Figures 6a and 6b plot the percent of teachers who failed the teacher certification exam for these groups of schools. Taken together transfers and quits are now as important as the initial match in determining the qualifications of teachers in low-performing schools or schools with high proportions of Black and Hispanic students. Table 9 examines the decomposition of the differences in teacher failure of the certification exam between high and low minority schools and high and low student achievement schools over time into the initial match component, a

component for quits and one for transfers. When we compare the proportion of teachers failing the certification exam between schools in top and bottom quartiles of percentage of students who are non-white, the initial gap for the 1995 cohort is 11.3 percentage points. As this cohort ages to the year 2000, the gap enlarges to 19.7 percentage points, implying that quits and transfers have added 8.4 percentage points or the initial match accounts for 58 percent of the total gap by 2000. Averaged over the 1995 through 2000 cohorts, initial match accounts for 53 percent of the gap. When the gap is examined across quartiles of student performance, the initial match accounts for 44 percent of the gap averaged across the 1990 to 1995 cohorts.

In order to parse out transfers from quits, the fourth column of Table 9 reports corresponding gaps for those teachers who remain in teaching for the six years, thus eliminating those teachers who quit during this time period. Using this gap, the final two columns report the percent of the disparities due to transfers and the percent due to quits. On average about 53 percent of the difference in the percent of failing teachers between the lowest and highest quartile of black and Hispanic students is due to the initial match; 42.7 percent is due to transfers and only 4.4 percent is due to quits. For the measure of low-scoring students, about 44 percent of the difference is due to the initial match, 40.7 percent to transfers and 15.8 percent to quits. While the initial match, transfers and quits all contribute to the gaps between schools within regions, transfers and the initial match are far more important than quits.

VII. Conclusions and Policy Implications

High turnover rates for teachers are endemic to many schools, from large public schools to small private schools (Ingersoll, 2001). In New York State more than a fifth of teachers leave within the first three years. In New York City, the median school has ten percent first year

teachers, but a tenth of New York City schools have 25 percent or more new teachers. Yet teacher quits are not the only teacher labor market issue facing schools. Schools differ substantially in the qualifications of their teachers (Lankford, Loeb, and Wyckoff, 2002). In New York State, white students are in schools in which an average of 7.1 percent of teachers who have taken a teacher certification exam have failed. The corresponding percent for non-white students is 21.2, three times as high. The quit behavior of teachers tends to add to these disparities; however, across regions of the state the initial match of teachers to schools is far more important than quits in determining disparities across schools, and within regions both initial matches and transfers between schools are far more important than quits. Research and policies that focus primarily on the attrition behavior of teachers will not be sufficient for understanding or addressing the differences across schools in teacher qualifications.

In addition to assessing the relative importance of initial matches, quits and transfers to the distribution of teachers, this paper uncovered a number of notable aspects of the teacher labor market in New York State.

- First year teachers are substantially older than they used to be. The drop in the proportion of teachers in the 21 to 25 year old age range occurred primarily in the 1970s and early 1980s, but has continued at a slower rate since then.

- Older entering teachers appear less qualified on a number of measures including test failure and the competitiveness of undergraduate institutions. However, they are less likely to have left by the end of ten years than their younger peers.

- While a substantial proportion of teachers leave after one or two years, this proportion has decreased steadily since the mid 1970s. Almost half of entering teachers teach for more than 10 years.

- Most teaching careers are stable with only a few teachers moving in and out of teaching. Most teachers that do take time out of teaching, transition early in careers and tend to stay out of teaching for a substantial period of time. Teachers also primarily remain teaching in the same field instead of switching from field to field.

- Administrators usually have many years of experience in the New York Schools. For example, on average principals have been in New York schools for 16 years.

- Male teachers have higher exit rates than female teachers during the first few years of teaching but, given that they stay during these years, they are more likely to stay in the following years. There is little difference in exit rates by the end of ten years. The observed gender differences in exit behavior represents a change from the 1970s and early 1980s when women were more likely to exit than men at all levels.

- Teachers from more competitive undergraduate institutions and those that have not failed teacher certification exams have higher exit rates. This trend has been consistent since the mid-1980s when our data allows this analysis.

- Elementary teachers are less likely to switch schools, switch districts or leave teaching in New York State. This trend emerged in the late 1970s and has been consistent since. There is little difference in exit rates by specialty for high school teachers.

- Teachers that start in urban schools are more likely to leave teaching. There has been a substantial decrease in the leaving rate over the past 20 years for teachers outside urban New York City schools, while quit rates in urban New York City schools have remained constant for the last ten years.

- Teachers from highly competitive undergrads who start in urban districts are substantially more likely to leave teaching than those starting in suburban districts. Thirty three percent of urban New York City teachers from competitive colleges left the system by then end of three years, compared with only 26 percent of the teachers in New York city suburbs or other urban areas and 22 percent in other suburban areas.

The value of teachers to student achievement is evident (Ehrenberg and Brewer, 1994; Ferguson and Ladd, 1996; Ferguson, 1991; Rivkin, Hanushek and Kain, 1998). But schools differ substantially in the qualifications and skills of their teachers. The goal of our broader research agenda is to understand these differences and uncover policies to address them. This paper is a step in that direction. In particular, it identifies the importance of the initial match of teachers to schools in determining differences both across and within regions and the importance of transfers in determining differences within regions. In order to reduce the gap in teacher qualifications, we must focus on these features of teacher career paths.

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Figure 1a: Age of Entry for Teachers Entering in 2000 with No Prior Teaching Experience

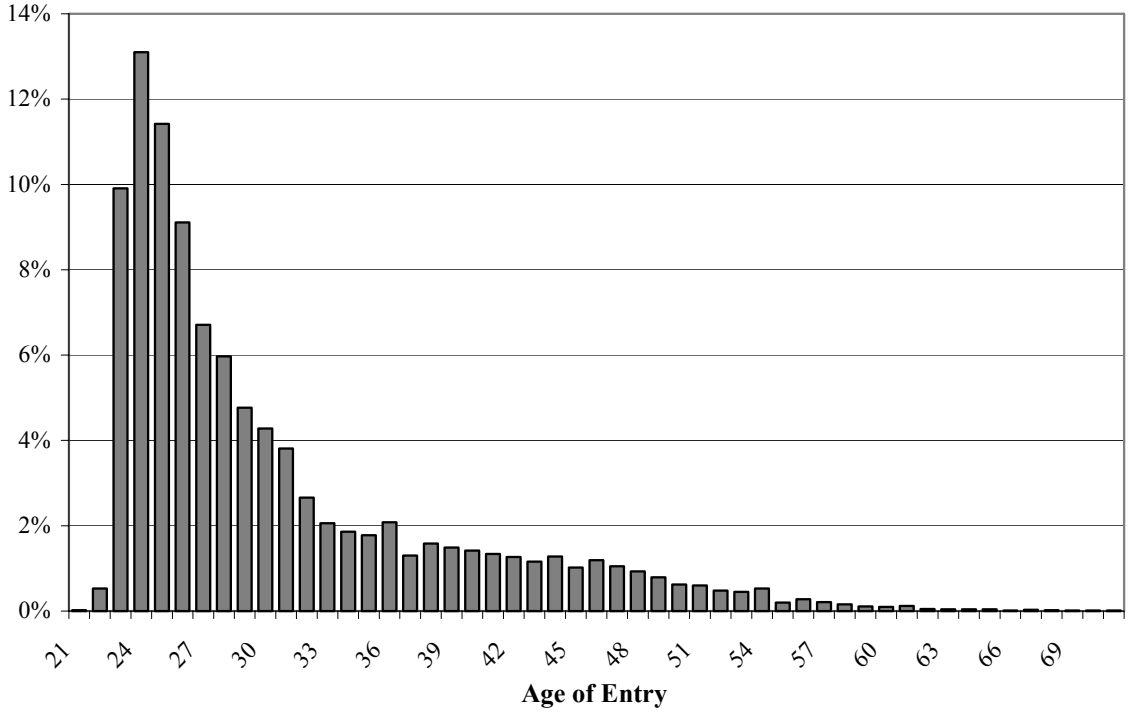

Figure 1b: Age of for Teachers Entering New York State Public Schools with No Prior Teaching Experience By Year

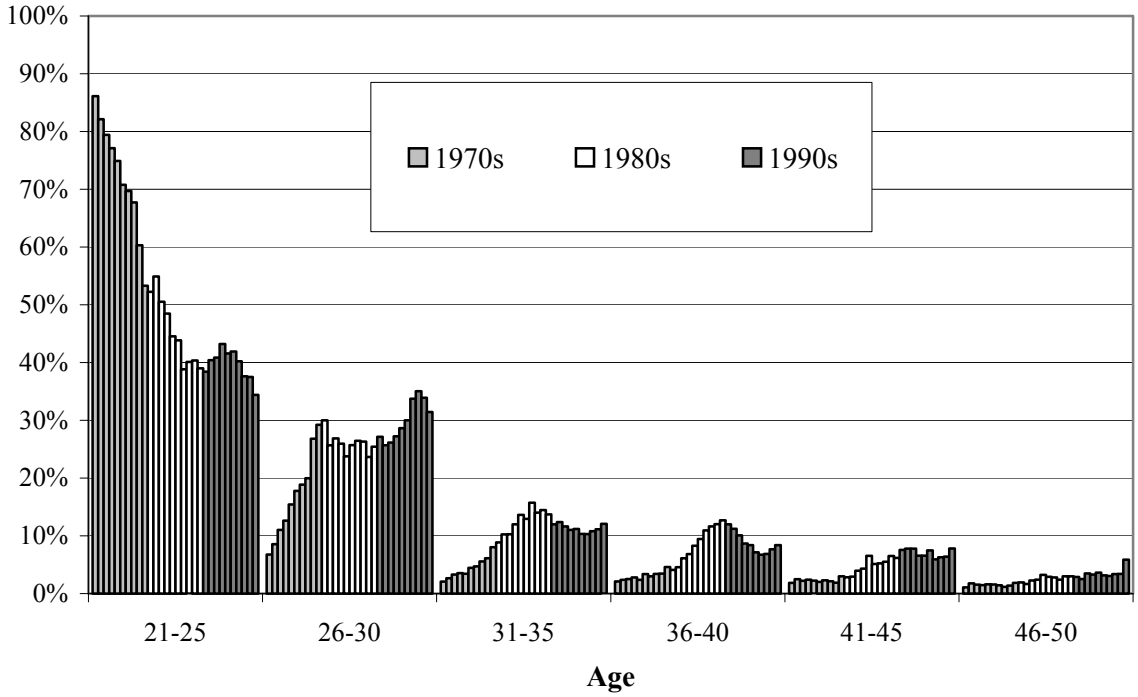

Figure 2: Survival Plots for Selected Cohorts. The Proportion of the Initial Cohort Remaining After the Corresponding Year

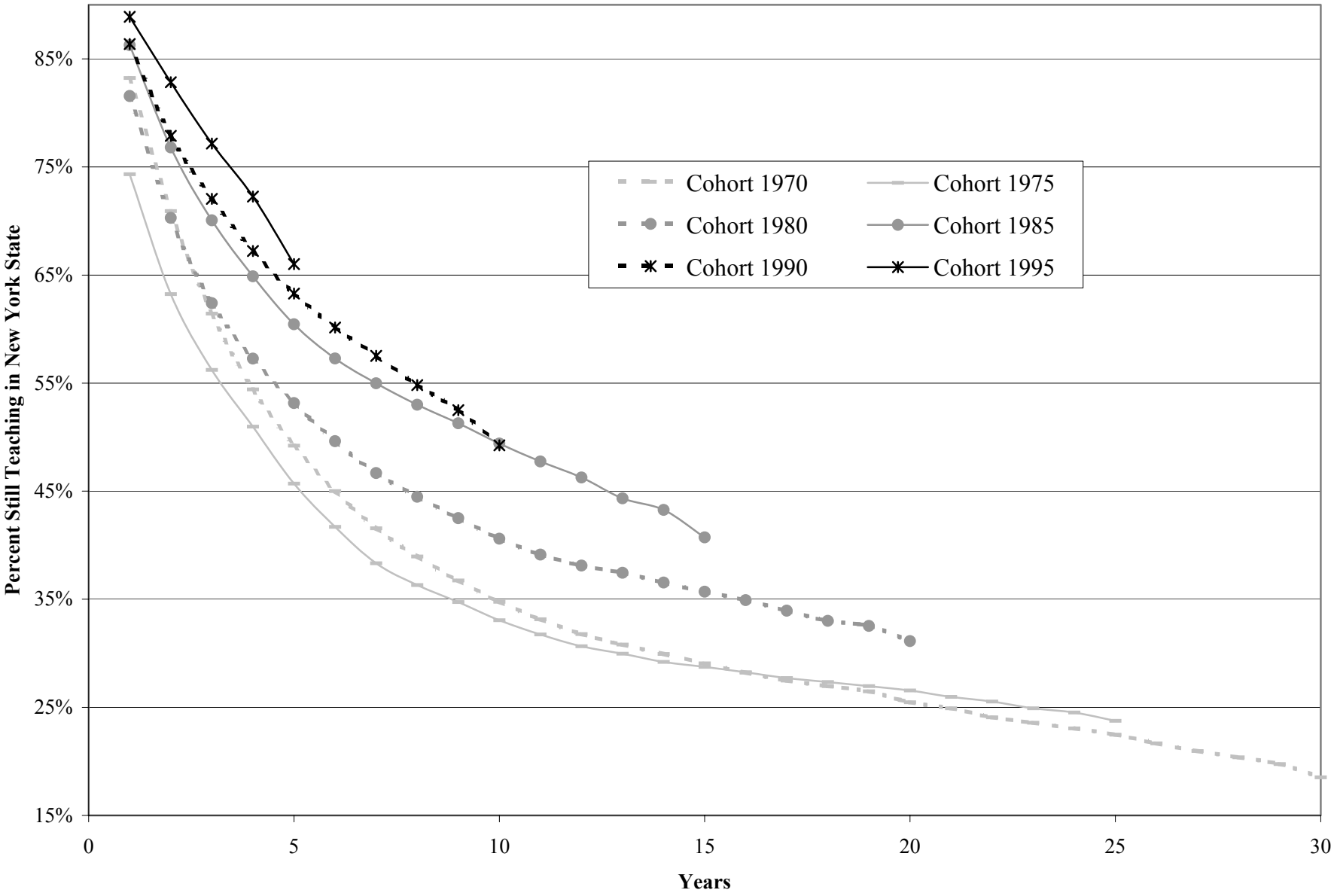

Figure 3a: Percent of Teachers from the 1990 Cohort Who Left Their First School, District and the New York State By the End of Their 1st, 3rd, and 10th Year, By Teaching Subject

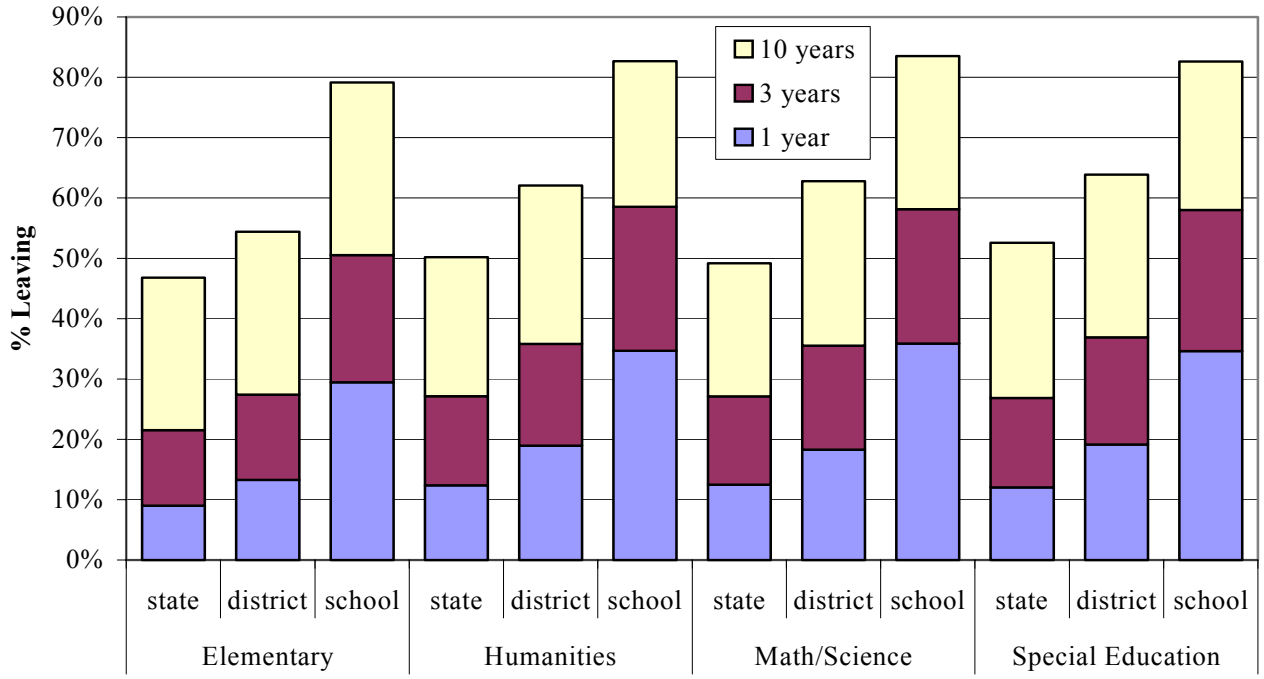

Figure 3b: % Teachers from 1990 Cohort Who Left Their First School, District and the NY By Whether the School is Urban or Suburban and in the New York City Metropolitan Area or the rest of the State

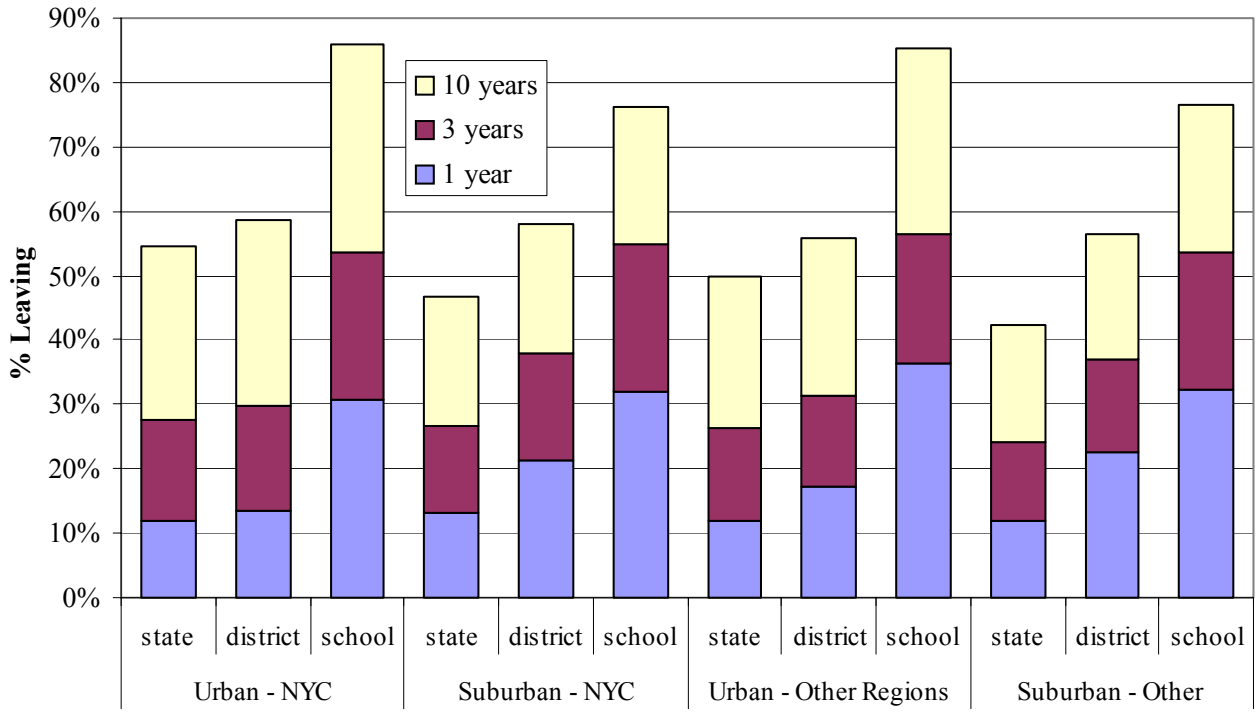

Figure 3c: Percent of Teachers from the 1987-1995 Cohorts Who Left New York State By the end of Three Years By College Competitiveness and Urban/Suburban (note averages for urban NYC, suburban NYC, urban other, suburban other are 29.0%, 23.2%, 24.6% and 23.0% respectively)

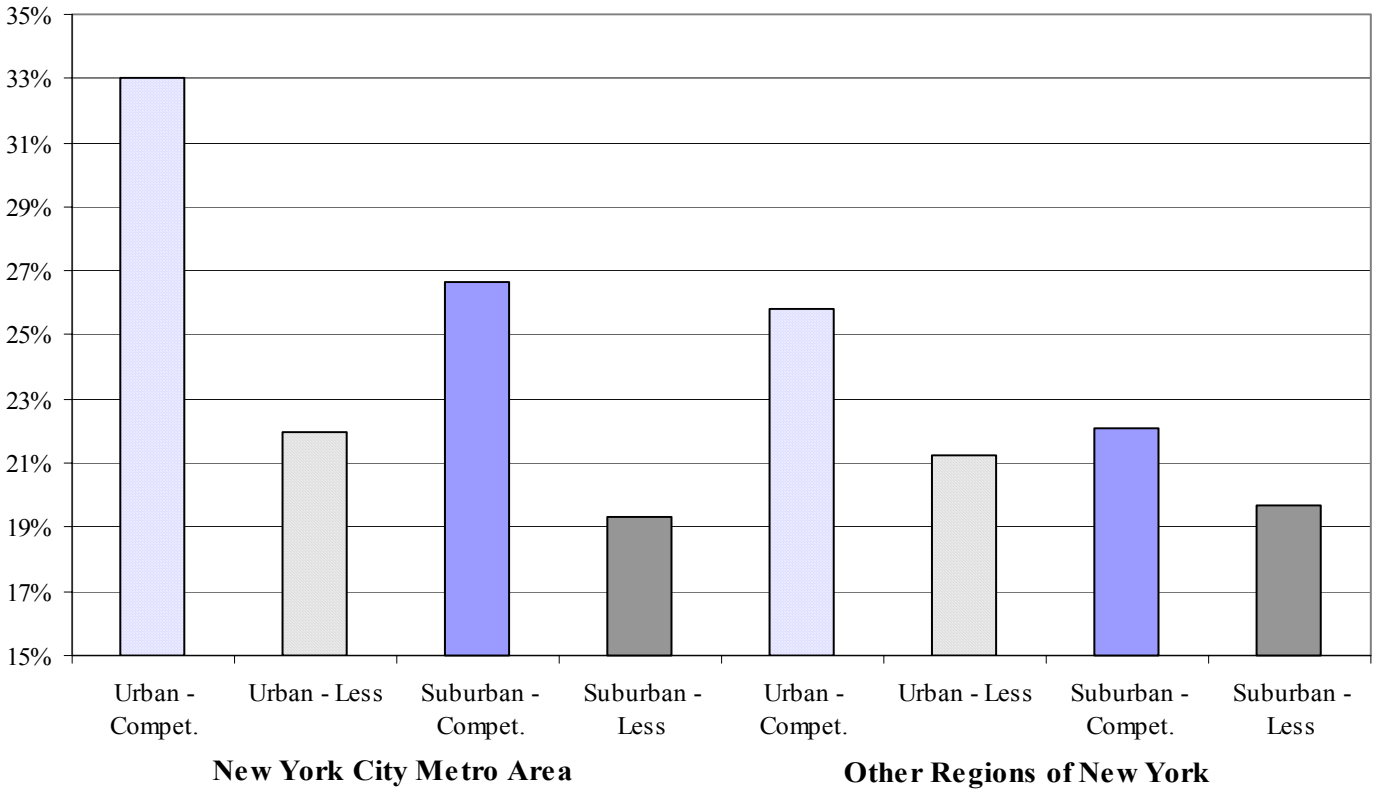

Figure 4a: Percent of Teachers Left Teaching By the End of Their Third Year By Gender

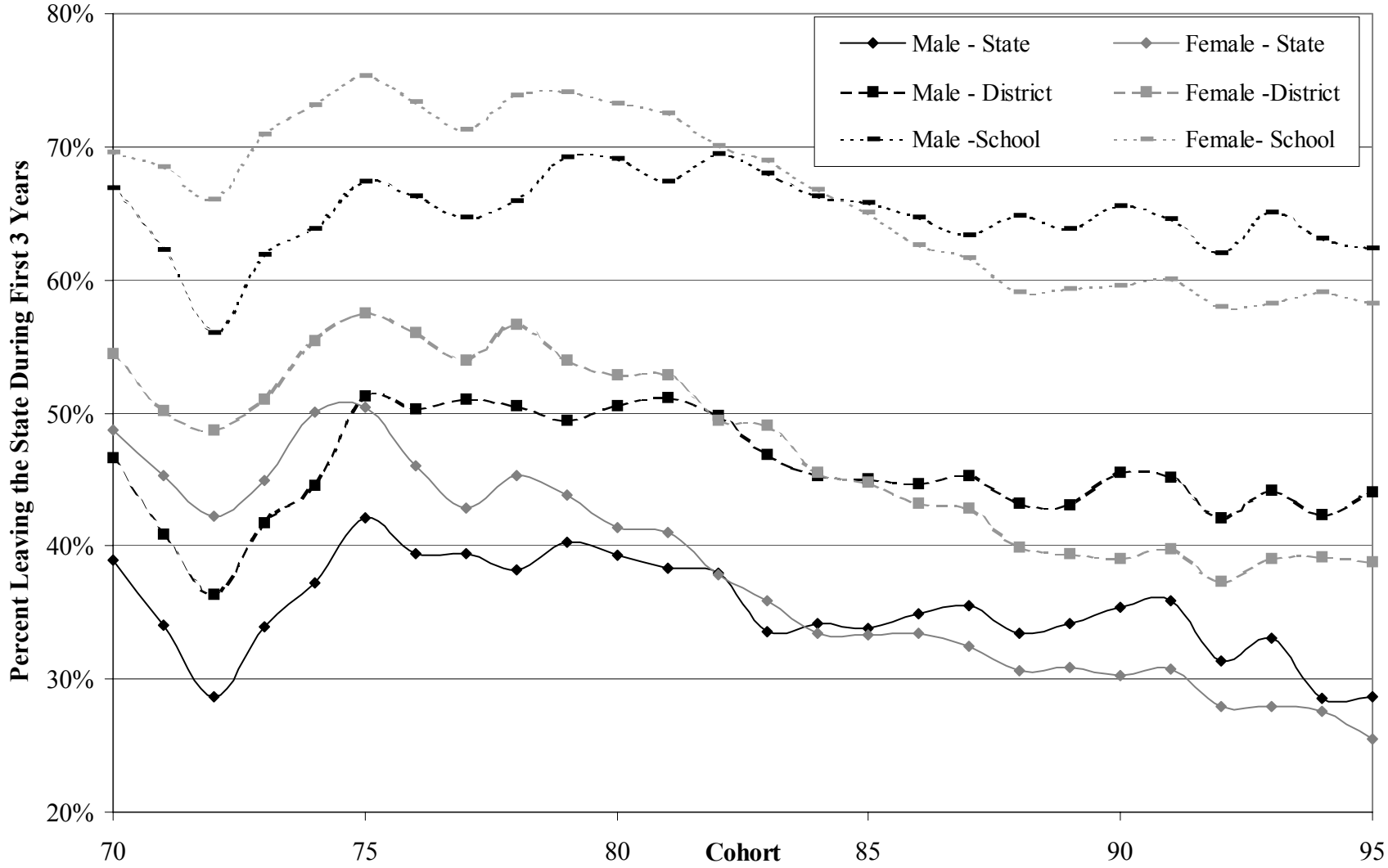

Figure 4b: Percent of Teachers Left Teaching By the End of Their Third Year By Barron's Ranking of Undergraduate

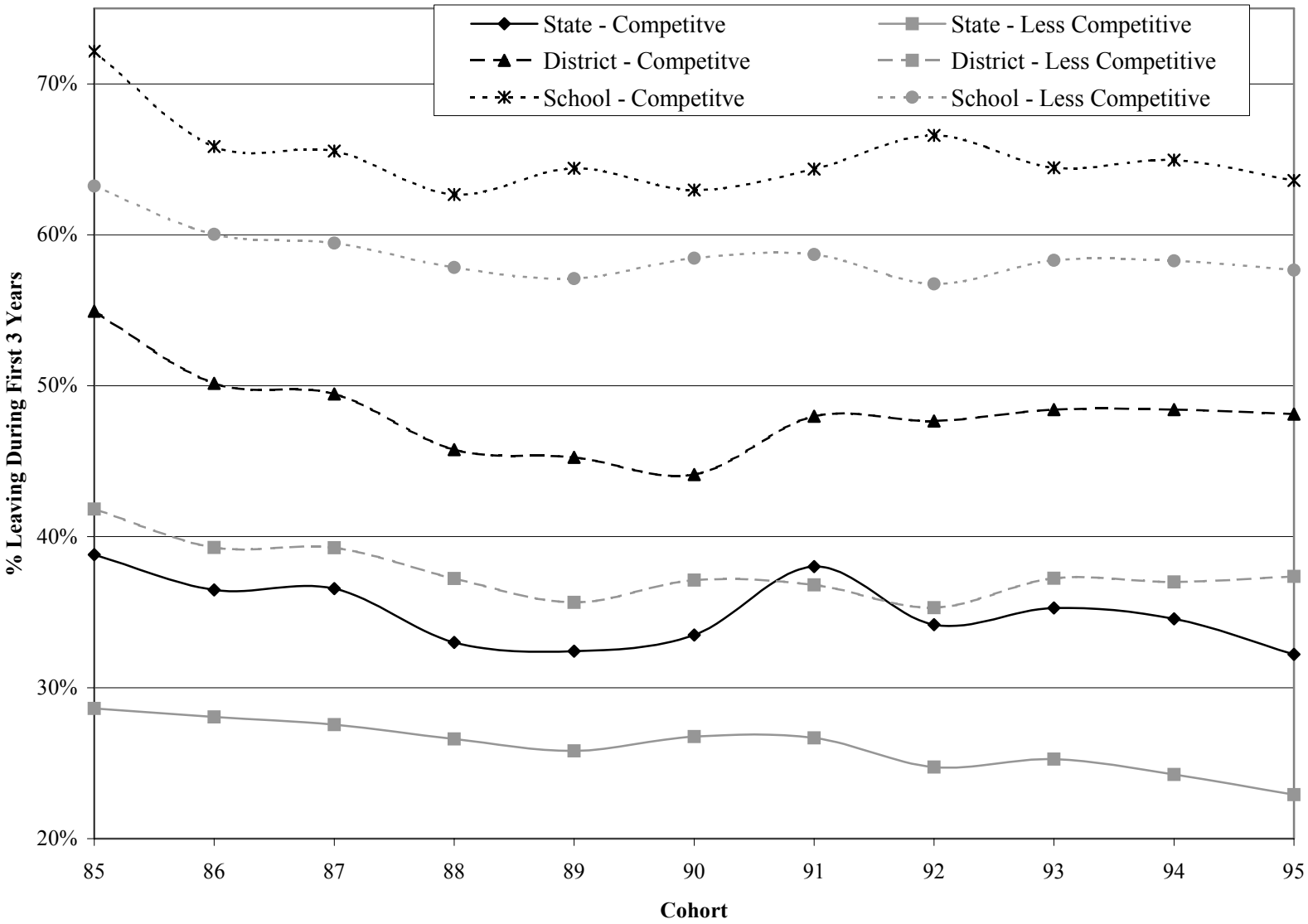

Figure 4c: Percent of Teachers Left Teaching By the End of Their Third Year By Urban/Suburban and New York City / Other (3 Year Rolling Averages)

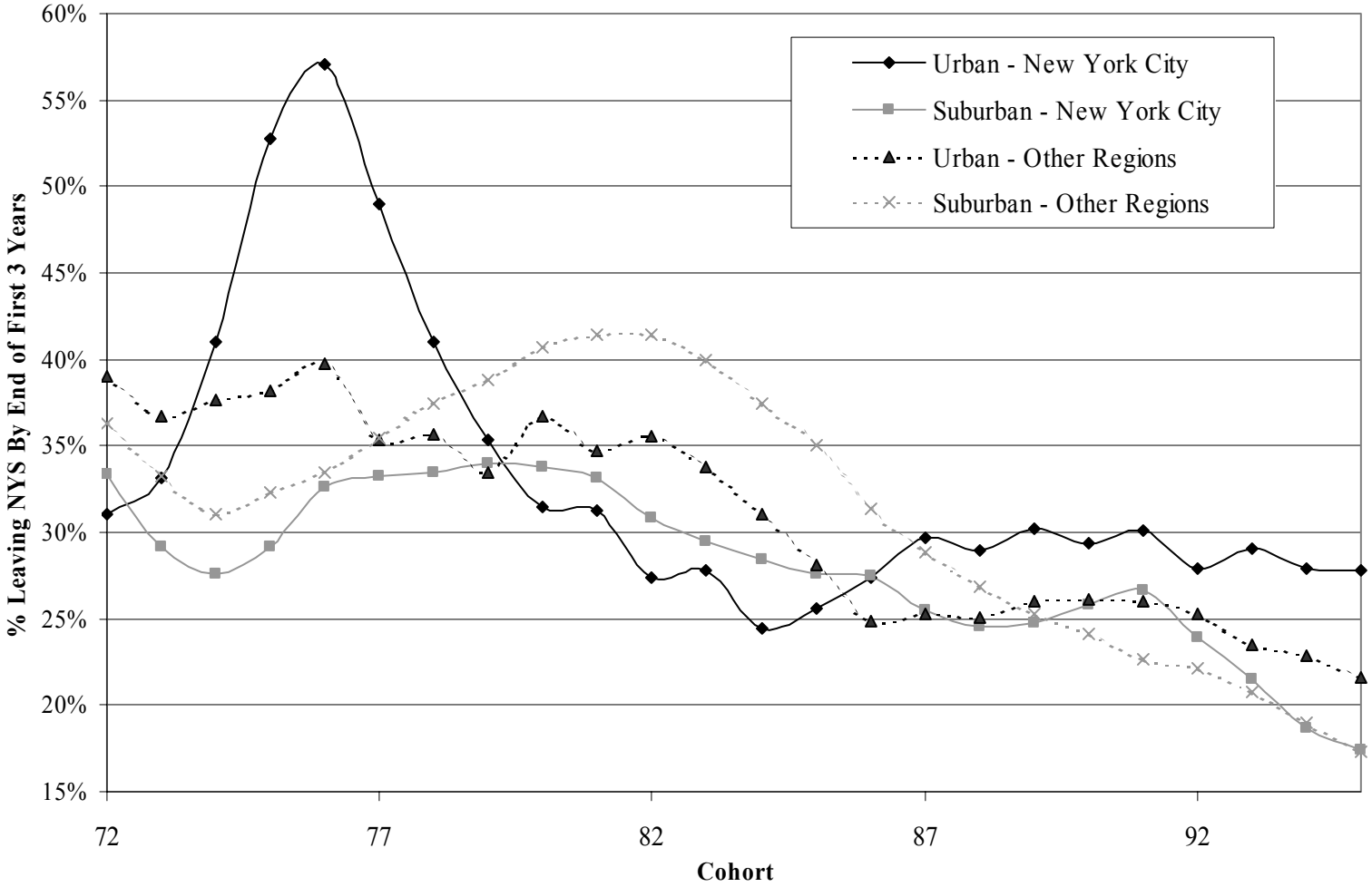

Figure 5: Percent of Teachers from the 1995 Cohorts Who Failed a Teacher Certification Exam

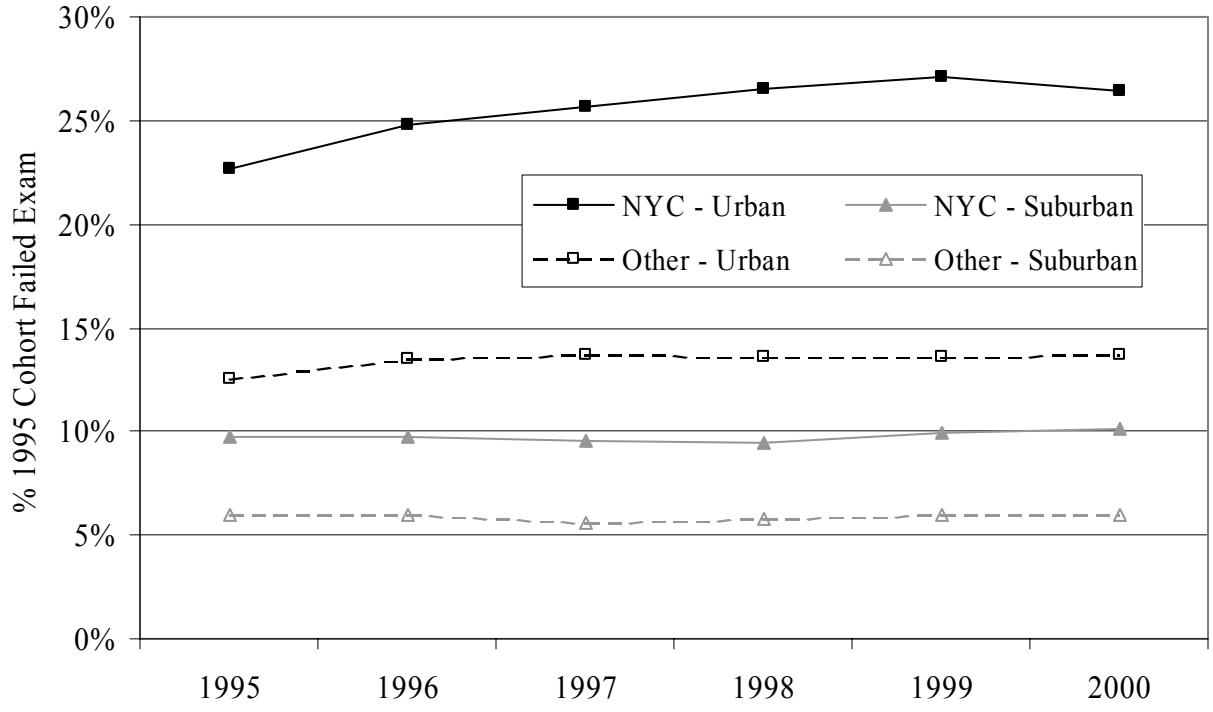

Figure 6a: Percent of New York City Teachers from the 1995 Cohorts Who Failed a Teacher Certification Exam by Quartile of Percent Minority Students in the Schools

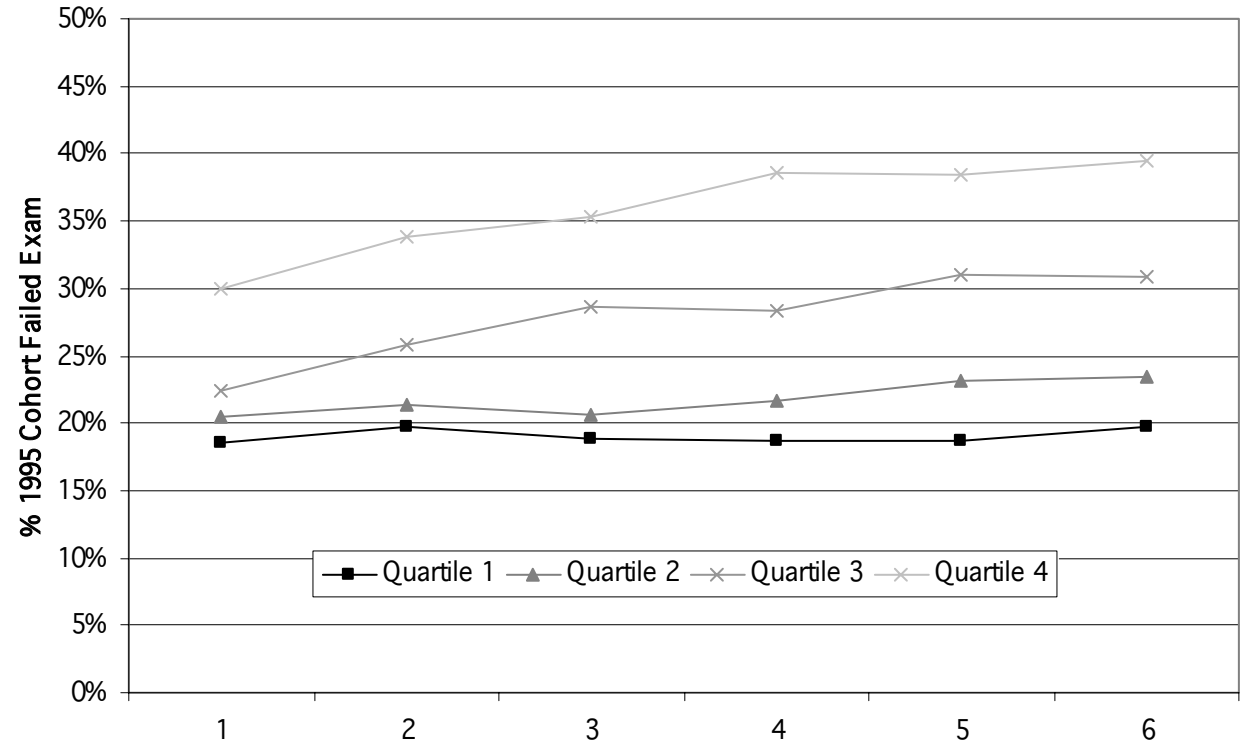

Figure 6b: Percent of New York City Teachers from the 1995 Cohorts Who Failed a Teacher Certification Exam by Quartile of Percent Students in the School with Lowest Level Test Score.

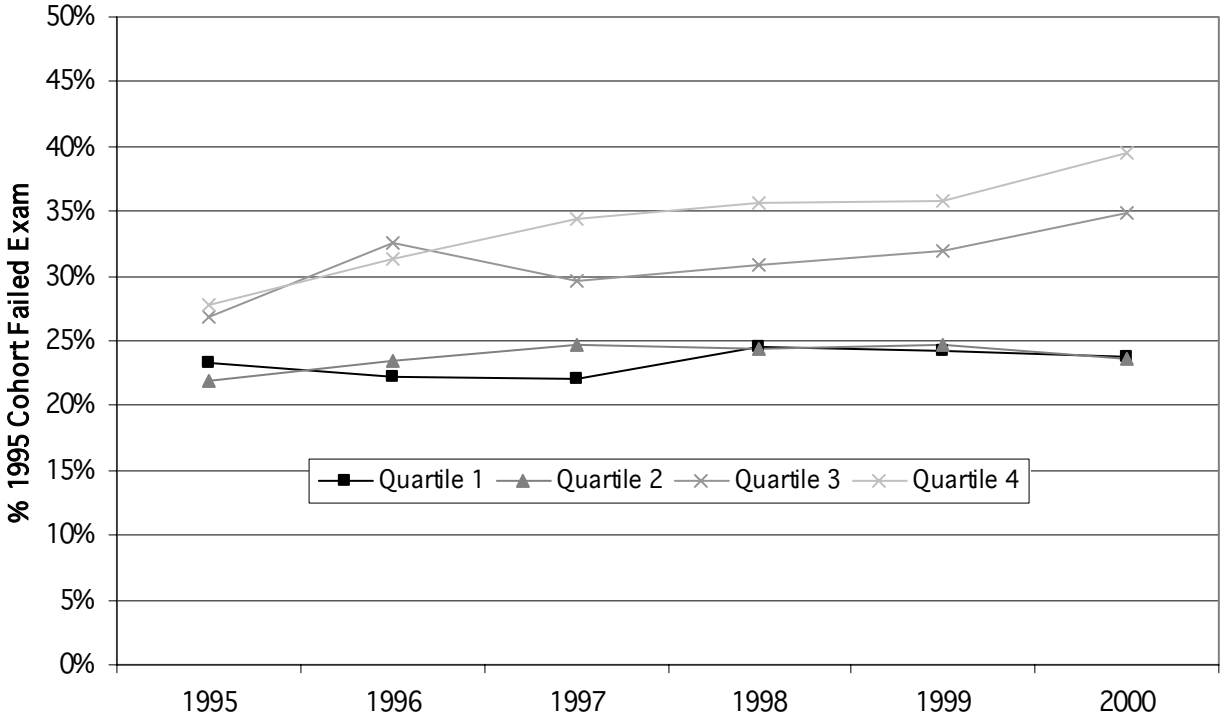

Table 1: Differences in the Characteristics of Entering Teachers by Age of Entry

	Age	Failed Exam*	Highly Compet	Least Compet	Urban	Suburban	Rural	NYC MSA
1995	< 30	6.4%	16.7%	8.7%	37.1%	42.0%	20.9%	55.5%
	>= 30	15.6%	12.1%	15.8%	43.8%	39.5%	16.7%	60.8%
1996	< 30	7.2%	16.0%	9.9%	32.0%	46.1%	21.8%	54.4%
	>= 30	12.2%	12.9%	14.6%	35.5%	46.2%	18.3%	55.3%
1997	< 30	8.4%	16.0%	11.8%	42.6%	42.4%	14.9%	64.0%
	>= 30	14.3%	11.9%	17.5%	44.3%	41.1%	14.5%	63.1%
1998	< 30	8.1%	14.3%	13.6%	44.2%	40.0%	15.8%	64.1%
	>= 30	14.2%	11.4%	18.0%	47.0%	38.3%	14.6%	65.0%
1999	< 30	8.4%	14.4%	12.5%	42.8%	41.5%	15.8%	62.5%
	>= 30	13.4%	10.3%	19.9%	41.7%	37.8%	15.1%	63.1%
2000	< 30	7.9%	13.5%	13.2%	41.6%	42.6%	15.8%	60.5%
	>= 30	14.4%	10.0%	19.1%	44.6%	38.4%	17.1%	59.6%

* The percent of teachers who failed the NTE General Knowledge Exam or the NYSTCE Liberal Arts and Science Exam on their first attempt . All differences for Failed Exam, and for Highly Competitive or Least Competitive Undergraduate are significant at the p<.001 level. Urban differences are significant at the p<.001 for 1995, 1998, 1999 and 2000 and at the p<.01 for 1996. Suburban differences are significant at the p<.001 for 1999 and 2000 and at the p<.05 level for 1998. Rural differences are significant at the p<.001 for 1995, 1996 and at the p<.05 for 2000. NYC differences are significant at the p<.001 for 1995

Table 2: The Nature of Career Paths During the First 10 Years of Teaching

Cohort	% > 1 District	%1 District Several Schools	% 1 School > 3 Years	% 1 School <= 3 Years
70	29.7%	25.8%	16.5%	27.9%
71	28.7%	27.7%	16.9%	26.7%
72	30.9%	26.3%	18.8%	24.1%
73	33.0%	26.9%	15.8%	24.2%
74	35.4%	24.5%	14.7%	25.4%
75	38.4%	21.6%	14.3%	25.7%
76	37.3%	21.4%	14.9%	26.4%
77	37.4%	20.7%	16.7%	25.2%
78	38.0%	21.1%	15.0%	25.9%
79	37.6%	24.0%	13.7%	24.7%
80	38.3%	24.7%	13.7%	23.3%
81	40.6%	22.1%	14.6%	22.7%
82	37.3%	26.9%	14.1%	21.6%
83	36.5%	25.7%	16.0%	21.9%
84	33.8%	26.8%	17.1%	22.3%
85	31.7%	27.1%	18.6%	22.6%
86	28.4%	27.8%	20.1%	23.7%
87	28.8%	26.3%	21.1%	23.8%
88	26.7%	28.5%	21.6%	23.2%
89	26.4%	28.4%	21.4%	23.8%
90	26.0%	29.5%	21.0%	23.5%

* The four groups are teachers who taught in (1) more than one district; (2) one district but more than one school; (3) one school for more than three years; and (4) one school for less than three years.

Table 3a: Number of Times Teachers Enter the New York State System (having not taught the previous year), Average Number of Consecutive Years Spent Teaching in Each Spell, and Average Number of Years Spent Between These Teaching Spells

# Spell in NYS	% Teachers	First Spell	Second Spell	Third Spell	First Break	Second Break
1	**70.5** (82.8)	**13.1** (9.8)				
2	**22.2** (14.1)	5.0	**11.4** (7.9)		5.8 (4.7)	
3	**6.1** (2.7)	4.3	3.7	**9.2** (7.2)	3.1	4.2 (3.8)

Table 3b: The Number of Districts Teachers Teach in During Their First Spell in the New York State System and the Average Number of Years in Each District

# of Districts	% Teachers	District 1	District 2	District 3	District 4
1	**61.7** (66.0)	**12.0** (9.2)			
2	**23.9** (22.8)	4.4	**11.3** (7.6)		
3	**9.3** (7.6)	3.6	3.6	**9.7** (7.0)	
4	**3.1** (2.3)	3.0	3.0	3.3	**8.1**(7.0)

Table 3c: The Number of Schools Teachers Teach in During Their First Spell in the New York State System and the Average Number of Years in Each School

# of Schools	% Teachers	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8
1	**35.1** (39.7)	**6.6** (6.2)							
2	**18.3** (21.1)	4.0	**8.4** (5.9)						
3	**14.3** (15.3)	3.9	3.0	**8.8** (5.7)					
4	**10.6** (9.6)	3.2	3.2	3.1	**8.0** (5.3)				
5	**7.9** (6.1)	3.1	2.6	3.3	2.9	**7.4** (5.1)			
6	**5.4** (3.6)	2.8	2.4	2.7	3.0	2.8	**6.3** (4.7)		
7	**3.6** (2.2)	2.7	2.2	2.5	2.4	2.9	2.7	**5.4** (4.3)	
8	**2.2** (1.2)	2.5	2.0	2.3	2.3	2.3	2.7	2.6	**5.1** (4.0)

Table 4a: The Movement of Teachers Across Teaching Fields. 1990 Cohort

Teaching Year 3		Teaching Year 7										
	% Teachers	Elem.	Humanities	Math	Science	Fine Art	Occ.Ed	ESL	Special Ed	Other Ed	Mixed	Total
Elementary	41.6%	**89.0%**	1.0%	0.6%	0.5%	0.5%	0.1%	0.5%	1.0%	4.3%	2.3%	100%
Humanities	11.5%	4.6%	**79.5%**	0.5%	0.9%	0.0%	0.5%	0.9%	4.9%	2.3%	5.9%	100%
Math	3.5%	4.5%	1.5%	**81.1%**	3.0%	0.0%	0.0%	0.5%	1.5%	2.5%	5.5%	100%
Science	4.4%	3.1%	0.4%	1.2%	**87.8%**	0.0%	0.8%	0.0%	0.8%	2.4%	3.5%	100%
Fine Art	1.1%	6.2%	0.0%	1.5%	0.0%	**66.2%**	1.5%	0.0%	0.0%	1.5%	23.1%	100%
Occ.Ed	3.8%	0.0%	0.9%	0.0%	0.5%	0.5%	**86.6%**	0.0%	2.3%	2.8%	5.1%	100%
ESL	1.5%	10.1%	7.9%	1.1%	0.0%	0.0%	0.0%	**62.9%**	4.5%	1.1%	12.4%	100%
Special Ed	17.9%	4.0%	2.3%	0.0%	0.4%	0.3%	0.4%	0.8%	**86.4%**	2.7%	2.5%	100%
Other Ed	8.6%	14.2%	3.0%	0.8%	0.2%	0.4%	0.2%	0.4%	2.4%	**70.3%**	7.7%	100%
Mixed	6.1%	20.0%	13.1%	7.4%	4.6%	2.6%	2.3%	3.4%	6.9%	15.4%	**24.3%**	100%

Table 4b: The Movement of Teachers Across Teaching Fields. 1980 Cohort

Teaching Year 3		Teaching Year 20										
	% Teachers	Elem.	Humanities	Math	Science	Fine Art	Occ.Ed	ESL	Special Ed	Other Ed	Mixed	Total
Elementary	39.1%	**81.7%**	2.1%	2.0%	1.8%	1.3%	1.0%	1.4%	1.8%	6.7%	0.2%	100%
Humanities	13.1%	5.2%	**75.3%**	2.0%	1.8%	1.7%	1.6%	2.7%	5.2%	4.2%	0.3%	100%
Math	4.7%	7.4%	3.2%	**75.0%**	2.1%	1.7%	2.8%	1.3%	2.1%	4.0%	0.4%	100%
Science	5.5%	5.3%	3.1%	3.7%	**76.3%**	1.1%	1.8%	1.8%	1.8%	4.1%	1.0%	100%
Fine Art	1.0%	11.9%	2.8%	0.9%	0.9%	**72.5%**	0.9%	0.9%	4.6%	4.6%	0.0%	100%
Occ.Ed	4.1%	2.2%	3.4%	1.7%	3.4%	1.7%	**78.4%**	1.3%	3.0%	4.3%	0.4%	100%
ESL	2.0%	6.8%	17.6%	1.4%	1.4%	0.5%	0.5%	**61.1%**	6.8%	2.3%	1.8%	100%
Special Ed	15.7%	6.3%	5.2%	1.6%	1.4%	1.4%	1.4%	1.8%	**76.6%**	4.2%	0.2%	100%
Other Ed	8.7%	18.8%	3.3%	1.4%	1.2%	0.8%	2.1%	1.7%	3.7%	**66.7%**	0.2%	100%
Mixed	6.1%	21.1%	19.6%	7.8%	8.1%	4.3%	6.1%	4.6%	7.2%	19.6%	**1.5%**	100%

Table 5: Administration – 1995 Cohort of Administrators

Administrative Role	Avg NYS Experience On Entering Admin	% Teachers Ever in Role ('70-'80 cohorts) >= 10 Years Exp	>=20 Years Exp
Superintendent	18.9	0.6 (0.6)*	0.7 (0.7)
Assistant Superintendent	16.9	1.0 (1.1)	1.2 (1.3)
Principal	16.1	4.5 (4.9)	5.4 (5.8)
Assistant Principal	14.7	5.9 (6.5)	7.0 (7.6)
Other Building Administration	14.6	5.1 (5.9)	5.5 (6.3)
Other Central Administration	13.6	4.4 (5.2)	4.7 (5.4)
Special Services	7.0	10.4 (11.2)	10.3 (11.0)
Subject Administration	12.4	12.1 (14.5)	12.7 (15.0)
% of Superintendents who were principals	57.7		

*Defined as half time (quarter time in parentheses)

Table 6: Percent of teachers with a Masters Degree at Entry and Both Percent and Average Years of Experience for those who obtain the Degree During Their Teaching Career.

Cohort	% New Teachers With MA	%New Teachers Get MA during Career	Years Experience When Obtain MA
70	8%	48.3%	11.2
71	10%	48.1%	10.8
72	10%	48.2%	10.9
73	12%	50.2%	10.3
74	13%	47.5%	10.2
75	16%	44.9%	9.9
76	19%	41.0%	9.7
77	20%	39.0%	9.7
78	27%	38.6%	9.4
79	31%	41.6%	9.1
80	32%	43.6%	8.9
81	33%	43.3%	8.5
82	37%	41.7%	8.3
83	34%	44.0%	7.9
84	37%	43.5%	7.6
85	34%	44.7%	7.3
86	32%	45.9%	7.0
87	33%	44.6%	6.6
88	34%	45.6%	6.2
89	33%	44.7%	5.8
90	33%	45.1%	5.4
91	34%	43.8%	5.0
92	36%	42.0%	4.6
93	36%	41.1%	4.2
94	37%	39.2%	3.8
95	38%	35.0%	3.4

Table 7: Differences in the Exit Behavior For the 1990 Cohort of Entering Teachers by Age of Entry, Gender and Competitiveness of Undergraduate Institution. (Percents Reported)

		< 30 on Entry	>= 30	Male	Female	Highly Comp. Under-grad	Not Highly Comp	Passed Exam	Failed Exam
After	School	32.6%	32.6	36.1	31.3	32.0	30.7	33.6	26.5
1 Year	Dist	19.3	17.1	20.2	17.5	18.5	16.6	19.8	8.4
	State	12.8	12.8	14.7	11.9	12.1	10.2	13.8	6.3
By	School	53.6	55.9	59.8	53.1	55.2	52.2	55.9	47.7
End of	Dist.	37.2	32.1	39.6	33.1	35.6	31.6	37.0	19.8
3 Yrs	State	27.6	25.7	30.7	25.3	26.8	22.3	28.3	16.4
By	School	77.0	83.8	82.1	80.1	84.7	78.7	80.9	78.9
End of	Dist.	66.1	53.5	63.1	59.1	67.8	56.6	61.5	51.1
10 Yrs	State	53.5	45.4	49.4	49.6	55.2	44.7	50.3	45.3

Age of entry is significant at the p<.001 level for three and ten year exits at the school, district and state levels. Gender differences are significant at the p<.001 level for all school and district exits. For state exits, gender differences during the first year and first three years are significant at the p<.001 level. All differences based on competitiveness of undergrad are significant at the p<.001 level. For failure, differences in state exits are significant at the p<.001 level of all years; differences in district exits are significant at the p<.05 level for year 1 and the P<.001 level for year 3; differences in school exits are significant at the p<.01 level for year 1 and the P<.001 level for year 3

Table 8: Differences Between the New York City Urban Schools and Non-New York City Suburban Schools in Teacher Characteristics at Initial Match and After Six Years, for all teachers and for only those teachers that remain for six years.

Year	All Teachers: initial gap	All Teachers: 6 years out gap	% initial*	Teachers Who Remain for 6 Years: initial gap	% quit**	% transfers**
Percent of Teachers Who Failed a Teacher Certification Exam						
1990	15.7	23.3	67.5%	18.2	10.7%	21.8%
1991	10.7	22.2	48.4%	12.2	6.8%	44.8%
1992	12.1	20.6	58.8%	12.1	0.0%	41.2%
1993	16.7	26.1	64.1%	17.9	4.6%	31.3%
1994	19.6	24.9	78.6%	21.2	6.4%	15.0%
1995	17.1	22.3	76.9%	18.3	5.4%	17.7%
average			**65.7%**		**5.7%**	**28.6%**
Percent of Teachers Who Graduated from a Least Competitive Undergraduate Institution						
1990	16.7	18.0	92.5%	18.3	8.9%	-1.4%
1991	16.5	17.9	92.1%	17.6	6.2%	1.8%
1992	17.2	18.9	91.1%	17.7	2.7%	6.3%
1993	17.3	18.7	92.4%	18.8	8.0%	-0.4%
1994	17.7	19.3	91.7%	18.8	5.7%	2.6%
1995	18.3	21.3	85.8%	20.7	11.3%	2.9%
average			**90.9%**		**7.1%**	**2.0%**
Percent of Teachers Who Graduated from a Highly Competitive Undergraduate Institution						
1990	6.9	6.7	103.6%	7.3	6.0%	-9.57%
1991	4.5	5.2	86.6%	8.0	67.3%	-53.91%
1992	6.5	8.0	81.6%	8.6	26.3%	-7.85%
1993	7.7	8.3	93.3%	9.6	22.9%	-16.19%
1994	5.6	8.8	63.4%	7.3	19.3%	17.28%
1995	5.6	8.4	66.6%	8.4	33.3%	0.07%
average			**82.5%**		**29.2%**	**-11.7%**

* %initial equals the initial gap divided by the 6-years-out gap. ** %quit equals the difference between the initial for remaining teachers and the initial for all teachers divided by the 6-years-out gap.

Table 9: Differences Between High and Low Proportion Minority Schools and High and Low Proportion Low-Scoring Schools in New York City in the Percent of Teachers Failing at Initial Match and After Six Years, for all teachers and for only those teachers that remain for six years.

Year	All Teachers: initial gap	All Teachers: 6 years out gap	% initial*	Teachers Who Remain for 6 Years: initial gap	% quit**	% transfers
			Black and Hispanic Student Quartiles			
1990	9.2	19.9	46.2%	11.8	13.07%	40.7%
1991	5.2	23.8	21.7%	9.5	18.07%	60.2%
1992	10.7	17.0	63.0%	10.6	-0.59%	37.6%
1993	13.8	23.0	59.9%	12.1	-7.39%	47.5%
1994	15.8	23.0	68.8%	16.2	1.74%	29.5%
1995	11.3	19.7	57.5%	11.6	1.52%	41.0%
average			**52.9%**		**4.40%**	**42.7%**
			Low Scoring Student Quartiles			
1990	9.8	14.9	65.6%	13.3	23.5%	10.9%
1991	2.8	23.5	12.1%	7.1	18.3%	69.6%
1992	5.5	13.9	39.3%	8.0	18.0%	42.7%
1993	14.1	24.7	57.1%	16.6	10.1%	32.8%
1994	13.2	22.8	57.8%	17.7	19.7%	22.5%
1995	4.5	15.6	29.0%	5.3	5.1%	65.9%
average			**43.5%**		**15.8%**	**40.7%**

* %initial equals the initial gap divided by the 6-years-out gap. ** %quit equals the difference between the initial for remaining teachers and the initial for all teachers divided by the 6-years-out gap.

Appendix A: Workforce Database

	Personnel data	*Certification and exam data*	*SUNY student data*	*School and district data*
UNIVERSE:	All public school teachers, superintendents, principals, and other staff	All individuals taking certification exams	All SUNY applicants (including non-teachers)	All public schools and districts
ELEMENTS:	- salary - course subject and grade - class size - experience (district and other) - years of education and degree attainment - age - gender	- scores on each taking of NTE and NYSTCE (general knowledge, pedagogy, and content specialty) exams - college of undergraduate and graduate degrees - degrees earned - zipcode of residence when certified - race	- high school attended - high school courses - high school GPA - SAT exam scores - college attended and dates - intended college major - actual college major - college GPA - degrees earned	- enrollment - student poverty (free and reduced lunch counts) - enrollment by race - limited English proficiency - student test results - dropout rates - district wealth - district salary schedule - support staff and aides
TIME PERIOD:	1969-70 to 1999-00	1984-85 to 1999-00	1989-90 to 1999-00	1969-70 to 1999-00
SOURCE:	New York State Education Department	New York State Education Department	The State University of New York	New York State Education Department