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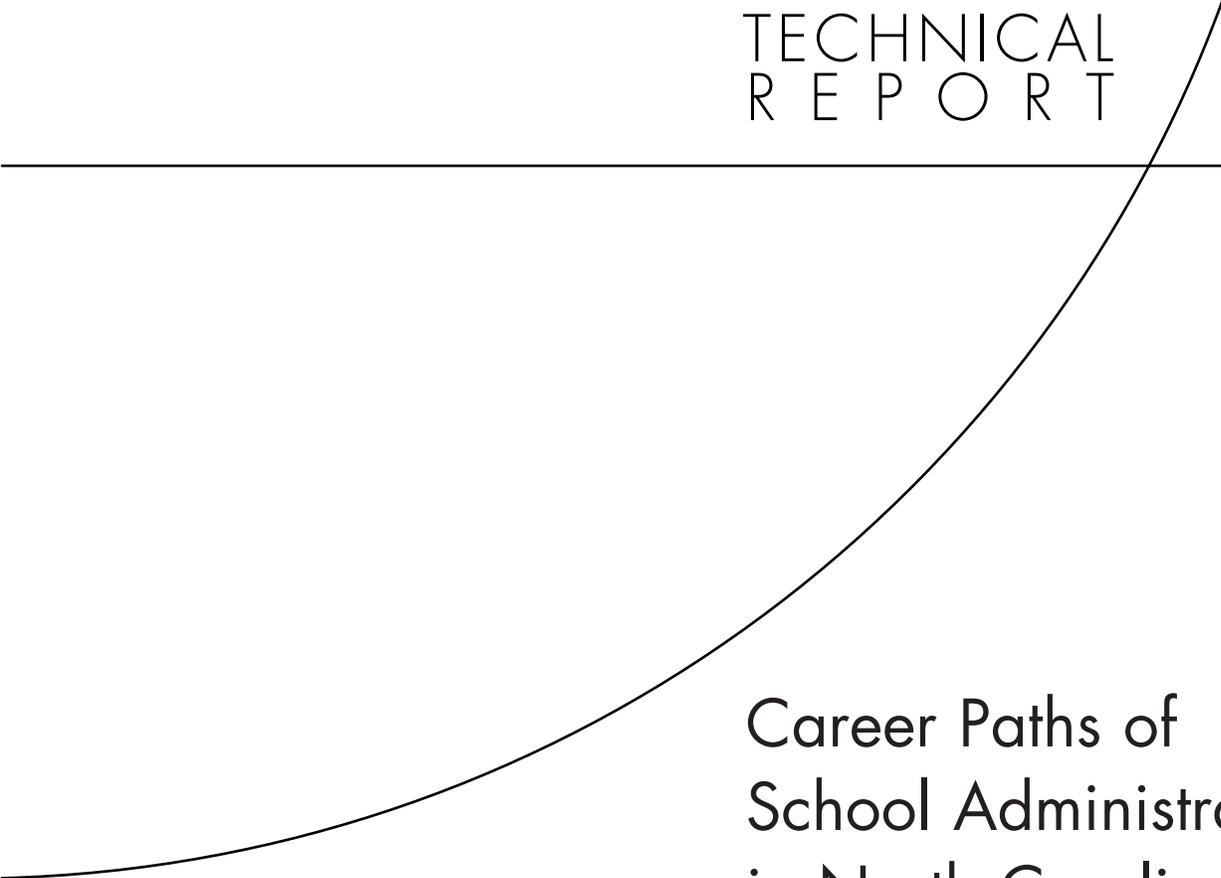View document details

Career Paths of School Administrators in North Carolina

Insights from an Analysis of State Data

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PREFACE

Despite concern on the part of some policymakers that schools and districts are having difficulty attracting and retaining people to serve as school and district administrators just when state and federal governments are increasing accountability requirements for these administrators and relying on them to promote improvement, there has been no real evidence showing that qualified people are indeed in short supply. Anecdotal reports about a shortage of effective administrators abound, but studies based on national data have offered little support for the idea.

The RAND Corporation undertook a study, as part of the Wallace Foundation's school leadership initiative, to examine the careers of school administrators by taking advantage of rich information available from state administrative data sets.

This report documents the study's methodological approach and presents results from an analysis in which detailed administrative data obtained from the North Carolina Department of Public Instruction were used to assess the careers of school administrators in the state of North Carolina. The report provides a comprehensive, descriptive overview of school administrators in the state and models the individual based on school characteristics associated with various career transitions. A companion RAND report presents a similar analysis of school administrators in Illinois (Ringel, Gates, and Ghosh-Dastidar, 2004); and two other reports (Papa, Lankford, and Wyckoff, 2002, and Lankford, O'Connell, and Wyckoff, 2003) provide similar analyses using data from New York. These three states—Illinois, North Carolina, and New York—represent fairly broad variation in market conditions and population trends.

This report should be of interest primarily to educational researchers and some education policymakers at the national, state, and local levels, not only because it conveys information about the current state of the market for school administrators in these states, but also because it demonstrates ways in which state-level administrative data

might be used to address crucial issues related to school administrators and their careers.

The work described in this report builds on previous RAND research (Gates, Ringel, and Santibañez, 2003) that developed a conceptual structure for understanding the careers of school administrators. That work also described what is known about the individuals who hold administrative positions nationally, how their characteristics have changed over time, and the factors that would be expected to influence individual decisions to assume particular administrative positions, focusing particularly on wages, working conditions, and barriers to certain positions.

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SUMMARY

According to anecdotal reports, schools in the United States are having difficulty recruiting and hiring school administrators, and the reigning perception has been that the difficulty stems from a general shortage of people qualified to be school administrators. This perception was called into question recently by three studies based on empirical information on administrative careers.

These studies, all of which were summarized in a Policy Brief by the Wallace Foundation (2003), suggest that the supply of nominally qualified (e.g., certified) individuals available to serve as school administrators is indeed adequate, but that the practices of human resources departments in schools and districts may be preventing schools from selecting the best candidates. By juxtaposing the conventional wisdom against the empirical realities, the studies reflect the importance of using empirical data where possible to monitor and better understand the labor market for school administrators.

In this report, we further develop this understanding of the careers of school administrators through an in-depth analysis of administrative data from the state of North Carolina. We describe in detail what state-level administrative data can reveal about the careers of school administrators in the state, what the data cannot reveal, and how further research and data collection might be directed to build on the advantages of systematic administrative data in order to provide a better understanding of the relationship between administrative career paths and learning outcomes for students.

An analysis of career paths sheds light on several questions of interest to states and districts. Public sector organizations often place value on the racial/ethnic and gender composition of their workforce. And many districts are working to ensure gender and racial/ethnic diversity among school administrators and to eliminate inequities in promotion rates to administrative positions. As a result, state and district policymakers may be interested in whether trends affecting school administrators with respect to racial/ethnic and

gender composition reflect progress toward statewide or local objectives. Policymakers at the state and local levels are also concerned about turnover among school administrators, a concern based on the belief that high levels of turnover deny schools the leadership stability they need to succeed. Career path analyses make it possible to investigate important trends in the level of administrative turnover, and to look at whether particular types of schools are facing substantially higher turnover than other schools are.

With the passage of the federal No Child Left Behind Act and state-level educational accountability initiatives, states and districts became very concerned about school quality, as measured by student achievement for all subpopulations of students. In attempting to improve school quality, districts and states need information about which characteristics of administrators best promote improved achievement for all students. With better data, analyses of administrators' career paths might ultimately help inform this key policy issue, as well.

Previous work by the RAND Corporation (Gates, Ringel, and Santibañez, 2003) provided a national overview of the careers of school administrators based on available national data. However, because national data are cross-sectional and typically cover only a sample of the education workforce, they cannot support a true analysis of career paths. It is possible to examine how the population of school administrators changes over time and how the characteristics of administrators are related to school characteristics, but it is not possible to consider transitions into and out of different positions or to compare those who move into administration with those who do not. Administrative data, on the other hand, are systematically collected, which means it is possible to track individuals over time and across schools and districts, and to cover the entire workforce of public professional educators and administrators. These data support rigorous and comprehensive longitudinal analyses on careers, career paths, and turnover.

This report presents an approach for using administrative data for career path analyses, as well as the results from applying such analyses to the North Carolina data. The first of our four research

objectives was to provide a descriptive overview of current and former North Carolina school administrators and their careers. Our descriptive analysis examined trends over time for the demographic characteristics of school principals, assistant principals, other administrators, and superintendents. We then focused on school principals and superintendents, examining the positions these individuals had held previously. Finally, we examined the positions held by first-time principals in the years following their move to the principalship.

Our second research objective was to identify characteristics of the individual and the school in which he or she works that are related to whether that individual transitions to a principalship or superintendency. We used a longitudinal event history modeling approach to examine the educators' decision to become an administrator.

Our third research objective was to identify characteristics associated with principal mobility and attrition, which is addressed using an event history approach similar to that used for the second objective. Our fourth objective was to consider how state administrative data might be used to help policymakers better understand the link between school administrators and student learning.

DESCRIPTIVE OVERVIEW REVEALS THAT CHARACTERISTICS OF NORTH CAROLINA SCHOOL ADMINISTRATORS HAVE CHANGED AS THEIR NUMBERS HAVE INCREASED

Our analysis revealed that the number of school administrators in North Carolina has grown substantially, but not primarily as a result of increases in the numbers of principals and superintendents. Between 1987 and 2001, the total number of school administrators grew by 61 percent (compared to 46 percent for teachers), but this growth was not evenly distributed across administrative positions. We found that while the number of other administrators more than doubled and the number of assistant principals increased by 71 percent, the number of school principals increased by a modest 11 percent and the number of superintendents actually declined by 16 percent.

It is important to note, however, that we found no evidence that this growth in the number of positions--which translates into demand for school administrators--ran up against a limited supply of candidates. Our analyses revealed no clear time trend in terms of the

probability that educators in North Carolina transition from teaching to the principalship.

As of 2000, women made up a majority of other administrators, assistant principals, and first-time principals, and were 29 percent of superintendents. In spite of steady growth, however, the proportion of female administrators remained below the proportion of female teachers (81 percent). When we focused specifically on principals, we saw steady growth in female representation between 1990 and 2000: In 1990, only 26 percent of North Carolina principals were female, but by 2000, nearly half (46.6 percent) were. The trend of increasing female representation in the principalship was evident at each grade level, although the proportion of women principals in elementary schools was over twice as large as that in high schools. We found that women principals were a majority (58 percent) in elementary schools, but were at 41 percent in middle schools, 35 percent in combined-grade schools, and 24 percent in high schools.

With the exception of the superintendency, where the proportion of those who were white declined from 87 to 81 percent between 1990 and 2000, we found only slight changes in the proportion of white school administrators in North Carolina. In 1990, 22 percent of North Carolina principals were racial or ethnic minorities; by 2000, 24 percent were.

CAREER PATH ANALYSIS REVEALS THAT GENDER AND RACIAL/ETHNIC COMPOSITION REMAINS A CONCERN

As mentioned earlier, public sector organizations often place value on the racial/ethnic and gender composition of their workforce. Specifically, governments often strive to ensure that the composition of their workforce reflects the composition of the population as a whole, and that the composition of management in government organizations reflects that of the government workforce as a whole. Despite the gains described above, the results of our multivariate analysis of career transitions raise some important concerns for policymakers on both scores.

First, we found that the gender gap is alive and well. Our analysis revealed that, across the board, females in the North Carolina public school system are less likely than males to advance to

administrative positions. When we controlled for other characteristics, men were still four times more likely than women to become principals directly (that is, without first serving as an assistant principal), and over three times more likely to become assistant principals. However, we also found that conditional on having become an assistant principal, there was little difference between men and women in terms of the probability of becoming a principal. This suggests that the source of the gender differential may lie at the point at which the individual makes the initial decision to move from teaching into administration. In addition, the results of our analysis also suggest that the gender gap is not a problem specific to high schools. Despite the stronger female representation among elementary school principals mentioned above, we found that women in middle and high schools are actually more likely than those in elementary schools to become principals or assistant principals. In other words, gender differences in the teaching pools at the elementary and high school level appear to be driving the differences in representation in school administration. Women make up 94 percent of elementary school teachers, compared with 63 percent of high school teachers. What this gender gap in the transition to administrative positions is caused by, we do not know. It could stem from differences between men and women in their preference for administrative careers, from gender-based discrimination in promotion, or from a combination of the two; our analysis did not allow us to identify a cause.

We also found that the administrative pipeline may not be well primed to sustain increases in the proportion of minority principals. Overall, our analyses suggest that educators in the North Carolina public school system who are African-American are slightly more likely to leave the system than those who are not African-American. In other words, retention is lower for minority teachers. Additionally, African-Americans are over two times more likely than non-African-Americans to become principals. At a time when the proportion of students who are minority is increasing, the pool from which minority administrators are drawn may be declining.

PRINCIPAL TURNOVER IS FAIRLY HIGH IN NORTH CAROLINA AND IS GREATER FOR SCHOOLS SERVING HIGH-MINORITY STUDENT POPULATIONS

Our descriptive analysis of individuals entering the principalship for the first time in the late 1980s and early 1990s suggests a fairly high degree of leadership instability in North Carolina schools. After six years, just under half (48 percent) of first-time, or new principals, were still principals in the state of North Carolina. And even among those who remained principals, a majority had moved to other schools: 18 percent remained in the same school, 8 percent became principals in a different district, and 22 percent became principals in a different school in the same district. Fourteen percent of first-time principals had returned to teaching six years later, 12 percent had assumed some other administrative position, and 26 percent had left the North Carolina public school system.

Our multivariate analysis of principal turnover helps in understanding principal turnover in North Carolina. Over the timeframe 1987—2001, turnover among all school principals, viewed from the perspective of an individual school, was 18 percent per year. However, we found that only 2.4 percent of this turnover was due to principals leaving the system. Specifically, among the pool of principals in a given year, 82 percent were principals in the same school the next year, 9.4 percent had become principals in a different school, 5.8 percent were still in the North Carolina school system but in another position (e.g., had returned to teaching or taken another administrative position), and only 2.4 percent had left the system entirely.

We found that principals in schools with a larger proportion of minority students were more likely to change schools within the public school system and to leave the principalship but remain in the system. This suggests that schools serving higher proportions of minority students may have a harder time retaining principals. However, we also found that a principal who is the same race/ethnicity as the largest racial/ethnic group in the school is less likely to switch schools or to leave the principalship to take another position in the school system. This suggests that high-minority schools might improve their leadership stability by hiring principals who are of the same

racial/ethnicity group as the largest minority group at the school, although the demographic trends discussed earlier imply that this may be a difficult strategy to implement.

Of course, we must emphasize that turnover is not always bad. Turnover may reflect an employee deciding to leave an organization, or the organization deciding that the employee should leave, or both. The belief that administrative turnover is bad for public schools reflects an implicit assumption that all sitting principals are good at what they do and that schools therefore suffer when there is principal turnover. However, it may be the case that schools with higher turnover are simply better at ridding themselves of principals who do not work out. A recent report by Public Agenda (2003) suggests that turnover among principals may indeed be inefficiently low, but that the school accountability movement may be changing that. Until there are reliable measures of principal quality, it is impossible to conclude whether schools that experience higher administrative turnover are really at a disadvantage relative to those that have lower turnover.

ADMINISTRATIVE DATA ARE SERIOUSLY LIMITED BY THEIR LACK OF DATA ON ADMINISTRATOR QUALITY

Our research is perhaps most illustrative for what it cannot tell us about school administrators. Specifically, our research highlights the fact that administrative data provide little insight into the performance of school administrators. Ultimately, the issues of greatest interest to policymakers are whether the education system is promoting and retaining individuals who are effective administrators, and which individual characteristics (including career experiences) are associated with administrative effectiveness. This report provides recommendations for data collection efforts that could help researchers and policymakers begin to address these issues.

ACKNOWLEDGMENTS

1. INTRODUCTION

In recent years, policymakers have become concerned about the possibility of a current or future shortage of personnel to fill administrative positions in public K—12 school systems. Anecdotal reports have suggested that some districts were scrambling to fill open administrative slots by enticing retired administrators to return on a temporary basis and by accepting uncertified individuals, prompting calls for an increased pool of certified school administrators, possibly by modifying administrative certification requirements. However, the belief that schools and districts are now and will in the future be facing a general shortage of school administrators was called into question by three recent empirical studies. A RAND Corporation study by Gates, Ringel, and Santibañez (2003) provided a national overview of the careers of school administrators and found little evidence that school administrators were being lured into other careers. Even during the economic boom years of the late 1990s, very few school administrators left their posts to take positions in the private sector. The study also found evidence that financial rewards do exist to compensate individuals who move from teaching to administration and to work in more-challenging school environments. Although one might naturally question whether the differential financial rewards are sufficient compensation for those working in challenging settings, the study found no evidence that experienced principals were systematically shunning certain types of schools. In an analysis of state data from New York, Papa, Lankford, and Wyckoff (2002) found that more than enough individuals who work in the New York state education system possess the administrative certification needed to fill impending vacancies. Roza (2003) interviewed individuals in charge of hiring in 83 public school districts and found that not only were principal shortages not common, but that there were on average 17 applicants for each open principal position. This third study suggests that the hiring practices of school districts may be placing excessive emphasis on experience.

While these studies provided some good news for schools and districts worried about a general shortage of school administrators, significant challenges must still be addressed. For example, the supply of certified personnel may appear to be generally adequate nationwide, but the ability of different schools and districts to fill available administrative slots varies significantly. And there is the issue of how adequate certification is, by itself, as a means of understanding or assessing the supply of candidates available for administrative positions.

Our study exploited the richness of state-level administrative data to analyze the careers of school administrators in North Carolina. An analysis of career paths can shed light on several questions of interest to the state and districts. Public sector organizations often place value on the racial/ethnic and gender composition of their workforce. Specifically, government agencies often strive to ensure that the composition of their workforce reflects that of the population as a whole, and that the composition of management reflects that of the government workforce as a whole. Many districts are working to ensure gender and racial/ethnic diversity among school administrators and to eliminate inequities in rates of promotion to administrative positions. As a result, state and district policymakers may be interested in whether trends in the racial and gender composition of their school administrators reflect progress toward statewide or local objectives. Policymakers at the state and local levels are also concerned about turnover among school administrators. A higher level of turnover means that the state or district must find more individuals to assume administrative positions, so it impacts the demand for school administrators in any given year. There is also concern that high levels of turnover deny schools the leadership stability they need to succeed. Career path analyses allow for an investigation of important trends in the level of administrative turnover, and may indicate whether particular types of schools within a state are facing substantially higher turnover than other types of schools are.

With the passage of the federal No Child Left Behind Act and state-level educational accountability initiatives, states and districts have become very concerned about raising school quality, as

measured by student achievement for all subpopulations of students. In attempting to improve school quality, districts and states need information about which characteristics of administrators best promote improved achievement for all students. With better data, analyses of administrators' career paths might ultimately help inform this key policy issue, as well.

This report documents the methodological approach we used and the key results of our technical analysis of school administrators in North Carolina. A companion report, by Ringel, Gates, and Ghosh-Dastidar (2004), does the same for the state of Illinois; and related studies, by Papa, Lankford, and Wyckoff (2002) and by Lankford, O'Connell, and Wyckoff (2003), consider the careers of school administrators in New York.[1] These state analyses go beyond previous research based on national data. Because state data are longitudinal, it is possible to examine the careers of individuals as they change positions. Rather than simply inferring how the market is changing over time based on an observation of changes in average population characteristics, we can examine actual transitions. This allows us to consider the paths individuals are taking into school administration, the characteristics of educators who move into school administration relative to those of educators who do not, the extent to which school administrators move from school to school, and the relationship between principal turnover and school characteristics.

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[1] In previous RAND research (Gates, Ringel, and Santibañez, 2003), we contacted states to determine whether they had data on individuals who worked for the state public schools that could be linked over time and across schools and districts. Twenty-nine states had linkable data, but many of them only had data from the mid-1990s, so our ability to do longitudinal analyses was limited. However, 13 states—DE, IL, IA, IN, LA, NE, NY, NC, OH, UT, NJ, PA, and WI—had data that could be linked to create career histories of ten years or more. Fourteen states—AZ, AR, HI, ID, KS, MD, MA, MI, MT, NV, NH, OK, VT, and VA—had no linkable data, although many of them were collecting snapshot information on an annual basis. California had data that were only partially linkable over time because there was not one unique identifier for an individual that was independent of the district in which that individual worked. As a result, it was not always possible to track individuals who moved within the state but across district boundaries. We were unable to get data for Colorado, because that state has a strict policy against releasing data.

OBJECTIVES

This report documents the analytical results of our study, for which we used state-level administrative data to examine the career paths of school administrators. Our analysis had four research objectives that relate to a number of policy questions.

The first of our research objectives was to provide a descriptive overview of current and former North Carolina school administrators and their careers. Although this overview is more limited than that in the national study by Gates, Ringel, and Santibañez (2003) because of its focus on administrators in only one state, it nevertheless expands on that earlier analysis in three ways. First, because we were able to link information on individuals over time, we could examine specific information on the path a person takes into different administrative positions. Second, we were able to characterize the career transitions individuals make *after* they become administrators. And, third, we were able to characterize demographic trends for several types of administrators, rather than just for principals.

Our second research objective was to identify factors of an individual and the school in which he or she works that are related to whether that individual makes the transition to a principalship or superintendency.

The third research objective was to identify characteristics associated with principals' mobility and attrition. For this objective, we focused our analysis specifically on principals and examined the factors related to whether a principal remains in his or her position in the next year.

Taken together, these first three research objectives provide a rich description of the labor market conditions for school administrators. This information can inform several questions of potential interest to state and local governments, questions related to administrative turnover and to the basic demographic characteristics of school administrators. For example,

- Is the state (or a particular district) making progress toward workforce diversity goals?
- Are educators from different gender and racial groups being promoted on an equitable basis?

- Are educators who attended highly competitive colleges retained and promoted at different rates than other educators are?
- What are the rates of administrative turnover? Are these rates increasing? Are they too high? Are some districts (or schools) having a harder time than others in retaining principals?

Our fourth, and final, research objective was to demonstrate the potential use of longitudinal administrative data for examining questions related to the link between school leadership and student learning. Ultimately, district and state policymakers are interested in understanding the career paths of school administrators only to the extent that such an understanding can assist them in identifying, selecting, and supporting school administrators who are effective at improving student learning. Our analyses reflect but a first step in achieving this larger objective.

DATA

Data for this study of school administrators were obtained from North Carolina's State Department of Public Instruction (DPI) for the period 1978 to 2001. The data were in four files, which we merged into one file. The first of these four files, the personnel file, contained basic demographic information, such as birth date, gender, and ethnicity. The second, the education file, listed degrees earned and the name of the institution of higher education. The third, the license file, contained information on licenses held; the fourth, the payroll file, contained information on job titles, the schools and districts in which the jobs were held, and partial information on salaries received.[2]

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[2] In North Carolina, public school teachers and principals are paid on a statewide salary schedule, determined by the state general assembly, that allows for variation according to the individual's number of years of experience and the size of the school in which he or she works. In addition to a person's base pay from the salary schedule, his or her total compensation may include several other state-level components, such as longevity pay (more than five years), new teacher orientation, mentor pay, and, since 1994, bonuses for meeting school-level goals.

In addition to receiving these state-level salary components, teachers and administrators generally receive a local salary supplement. As of 2001, the North Carolina public school system

The North Carolina Department of Education provided information on the monthly salaries associated with certain job assignments, but the data were incomplete and did not contain a measure of total compensation. In addition, the Department supplied us with data on salary supplements offered by the various local education agencies (LEAs) in North Carolina between the years 1987 and 2001. The supplemental salary data reported the number of teachers and principals in each LEA, the numbers receiving salary supplements, and the average supplement per person. Since these supplements were not distributed in the same manner across LEAs and were not necessarily distributed among teachers and administrators in a uniform manner within LEAs, we were unable to assign particular supplements to the individuals in our teacher and administrator data set. Cleaning the data and restricting them to the 1980—2001 period gave us a data set in which 201,116 unique individuals were represented.

We merged this state information from North Carolina with information from the U.S. Department of Education's Common Core of Data (CCD) on schools and districts, which provides additional information on the schools and districts, such as student demographic information and enrollment starting in 1987. We also coded information from the 1986 Barron's ranking of college quality (Barron's Educational Series, 1986) to create a measure of the quality of the undergraduate institution that an individual had attended.

Administrative data such as these have plusses and minuses in terms of their usefulness for research purposes. An important positive aspect of the data is that they provide a comprehensive picture of

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comprises 117 local education agencies (LEAs), most of which are counties. Each LEA is allowed to pay teachers and administrators a salary supplement, the size of and basis for which are at the LEA's discretion. These salary supplements can vary widely. In general, the largest supplements are in the urban districts and the lowest are in the rural districts. In 2001—2002, for example, average teacher supplements in different LEAs ranged from zero in several counties to $5,520 in the Chapel Hill—Carrboro district. Average principal supplements in that year ranged from zero in some counties to $23,148 in the Charlotte-Mecklenburg district. Walden and Sogutlu (2001) found that supplements were often higher in districts with higher cost-of-living measures, higher concentrations of secondary school teachers, higher average school sizes, and higher per capita income.

every individual who works in a professional capacity in the state public education system. This is not a random sample from which we generalize about the population as a whole. Another important aspect of these data, not typically found in survey data, is that they are collected on a regular basis and make it possible to link records of individuals over time. This enabled us to actually examine career movement, rather than having to resort to inferring career movement based on changes in the average population.

Despite these advantages, however, administrative data are limiting in that they are collected on the basis of administrative needs rather than research interests. In the case of state educators and administrators, administrative data are collected primarily to maintain the information needed to calculate retirement benefits, to provide counts of the number of individuals in different positions, and to ensure state certification requirements are being met. Specifically lacking is any direct information on the quality of the individual's job performance.[3]

DEFINITIONS

Several definitions and caveats are important to bear in mind while reading this report.

The data provide limited information on the experience of individuals in North Carolina's public schools. The information on the years of experience of individuals present in the system in the first year for which we have data, 1978, is poor.[4] In addition, we have no information on the experience of individuals who worked in private schools in North Carolina or in public schools in other states.

We consider urban, suburban, and rural distinctions as well as county wealth indicators in our multivariate analyses.

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[3] Administrative records can incorporate quality-related information, such as the results of performance evaluations. However, the state-level data do not include such information.

[4] Although the files contain a variable called *experience*, this variable is used for purposes of salary determination and does not reflect actual years of experience in the state system. Individuals are given experience credits for additional activities or as a reward for longevity.

We use the term *first-time principal*, or *new principal*, to describe an individual who is in his or her first year of a principalship in North Carolina.

Finally, we define *cohort* as a group of individuals who all enter the principalship (or in some cases, another position) in the same school year.

SCOPE

This report is intended to provide a thorough documentation of our analyses of administrative career paths using the North Carolina state data. While the data provide a comprehensive understanding of the careers of all professional public school personnel in the state, they lack direct measures of the quality of performance. Data analyses using these administrative records thus can inform policymakers about issues such as how the characteristics of administrators have changed over time, who becomes an administrator, and what types of schools have higher or lower turnover rates. However, the data cannot be used to distinguish between effective and ineffective teachers or administrators, nor can they reveal whether those who become administrators or remain in administrative positions are good at what they do.

In economic analyses of career paths among individuals working in private sector organizations, there is an implicit assumption that promotion is an inherent signal of an individual's quality (Biddle and Roberts, 1993; Forbes, 1987). For-profit firms have an incentive to promote the most-capable individuals, since firms that do not do so will be unsuccessful and will ultimately fail. The same assumption may not be valid in public sector organizations, however. In a recent national survey of private sector, private nonprofit, and federal government employees, Light (2001) found that, compared with private sector employees, federal employees are much more likely to report that their employers do not ask enough of poor performers and are less likely to report that their organizations effectively discipline poor performers. A recent survey of federal workers (U.S. Office of Personnel Management, 2003) provides additional reason for concern. Only 27 percent of survey respondents reported that managers of their

work unit take steps to deal with poor performers, and only 36 percent believe that promotion decisions are based on merit in their work unit.

Our analyses, then, are limited by the information contained in the administrative data sets. As a proxy for individual ability or leadership capacity, we examined the ranking of the undergraduate institution attended by the individual, and the individual's education and experience. We caution readers, however, that there is no evidence to suggest that individuals who attend highly competitive colleges make better school leaders than do individuals who do not attend such colleges. What we do know is research shows that individuals who attend very, or highly, competitive colleges have higher lifetime earnings (Brewer, Eide, and Ehrenberg, 1999; Fitzgerald and Burns, 2000). So even though we cannot say that individuals who attend highly competitive colleges make better principals, we can surmise that such individuals have better labor market opportunities outside of education compared with those who attend noncompetitive colleges.

Another limitation of our analyses stems from the fact that the data are solely for individuals working in North Carolina's public education system, and not for individuals working in the state's private and charter schools. An individual who stops working for the public school system simply drops out of our data set. There is no way to know whether that individual died, retired, left the workforce for some other reason, left to work in a private or charter school, or left to work in another state.[5]

Finally, because the data cover only individuals who work in North Carolina—which is only one of the 50 states—readers may wonder about the extent to which our analyses can be seen as shedding light on challenges more generally.

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[5] North Carolina began a charter school program in the 1997—1998 school year. In 2000—2001, North Carolina had 95 charter schools and ranked sixth out of the 50 states and Washington, DC, in terms of number of charter schools in operation (five states had more than 100 charter schools, and 15 had none—see http://www.stateline.org). There were 99 charter schools in operation in 2002—2003 in North Carolina, and the system has proved very popular with parents. The legislature is considering lifting the original cap of 100 (Noblit and Corbett, 2001, p. II-5).

There are several reasons to focus attention on North Carolina. The state has experienced rapid population growth in recent years (21 percent between 1990 and 2000), so its experience may be informative for other fast-growing states. The state public education system includes urban, suburban, and rural districts, and, as is true of many U.S. states, the population is shifting from rural areas to the suburban sprawl. The number of school districts in the state is relatively low: 120 in 1999—2000.[6] The average number of students per district is 10,633, which is much higher than the national average of 3,573. The average per-pupil spending in the state is low, and there is low variation in spending across districts. North Carolina has also been in the forefront of state educational accountability initiatives.

The state of Illinois, which is the subject of a similar analysis in a companion report (Ringel, Gates, and Ghosh-Dastidar, 2004), provides a useful contrast to North Carolina. Like North Carolina, Illinois contains a wide range of urban, suburban, and rural districts. But Illinois has the country's third largest school district (Chicago, with over 430,000 students), and the average number of students per district is 2,263, which is well below the national average. Illinois has a relatively large number of school districts (896 in 1999—2000), many of which are quite small. And although, compared with the rest of the states, Illinois is in the middle in terms of average per-pupil spending, it has one of the highest degrees of interdistrict variation in per-pupil spending.

To help readers interested in the extent to which North Carolina can be viewed as similar to or different from other states, the next section provides general information on factors that influence North Carolina's labor market for school administrators. Moreover, because the conclusion one reaches in comparing states will depend on the issue being considered and on state characteristics related to that issue, the next section also provides general background information on the state itself.

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[6] District size information was calculated based on information from the U.S. Department of Education's Common Core of Data (CCD) for the 1999—2000 school year.

FACTORS AFFECTING THE LABOR MARKET FOR SCHOOL ADMINISTRATORS IN NORTH CAROLINA

Several factors may be important to the labor market for school administrators in a state. These include population growth and relative population changes across regions, state policy for education funding, statewide reform initiatives, and certification requirements, each of which might affect both supply and demand.

Population Growth and Demographic Shifts

The demand for school administrators is influenced in part by the number of school students, which in turn is influenced by population growth and change. North Carolina has experienced dramatic population growth over the last decade. In 2000, the state population stood at just over 8 million, representing 2.9 percent of the U.S. population. Between 1990 and 2000, the state population grew by nearly 1.5 million, representing a 21.4 percent growth rate, which is substantially higher than the overall U.S. population growth rate of 13.2 percent (Perry and Mackun, 2001).

Geographically, North Carolina can be thought of as three regions that correspond to the natural terrain: the coastal plains, to the east; the Piedmont, running through the center of the state; and the mountains, to the west. The Piedmont is the more urban, diverse, and wealthy stripe that separates the two generally more rural, poor flanks. While the two more rural regions are similar demographically in many ways, the mountain region has a much higher white population than either of the other two regions do: 91 percent, as opposed to 73 percent and 72 percent in the Piedmont and coastal regions, respectively (North Carolina Rural Economic Development Center, Inc., 2003). In the first half of the 1970s, the entire state grew at an approximately even rate. In the second half of the 1970s, the Piedmont region began to grow at a much higher rate relative to the coastal and mountain regions.[7] Most of the population growth in North Carolina has been due to net in-migration rather than births (Employment Security Commission of North Carolina, n.d.).

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[7] http://demog.state.nc.us/.

Throughout the state, the population is almost entirely white and African-American, and the proportion of the population identified with each race has remained fairly constant over time, with whites making up approximately 72 percent of the population and African-Americans making up approximately 22 percent. The state's Hispanic population, which has historically been very small, grew dramatically in the last decade, from just 56,667 people (0.9 percent of the state population) in 1990 to approximately 378,318 (4.7 percent) in 2000 (North Carolina Rural Economic Development Center, Inc., 2003). Asians have had an even smaller presence in the state, though their share of the population has been growing as well, from 0.33 percent in 1980 to 1.4 percent in 2000 (North Carolina Rural Economic Development Center, Inc., 2003; Brookings Institution, 2000).

The economic boom of the 1990s was very kind to North Carolina. Although the state has lost jobs since the economic downturn, its economy is diverse enough to allow it to weather the downturn better than some areas of the country (Brookings Institution, 2000, p. 15).

Despite North Carolina's across-the-board population and economic growth, there is great income disparity. Average 2001 per capita income ranged from $13,096 in Hoke County (in the coastal plains) to $38,404 in Mecklenburg County (home to Charlotte, in the Piedmont) (Poteat et al., 2003). In general, rural areas in North Carolina lag behind urban areas in terms of economic development. As recently as 1980, more than 100,000 rural homes did not have indoor plumbing (North Carolina Rural Economic Development Center, Inc., 2003).

North Carolina's population growth may imply shifts in the overall demand for school administrators, with rapidly growing demand in the Piedmont area, and more consistent demand in the mountain and coastal areas.

Requirements for Administrative Certification

In the United States, the states play an important role in determining the supply of school administrators because they define the concrete requirements for all school administrators within their boundaries. North Carolina's requirements are among the more stringent of state requirements for school administrators (Gates, Ringel, and

Santibañez, 2003). Candidates for the principalship must obtain a principal's license, either through reciprocal programs with other states or by completing a master's degree in school administration, and they must pass the School Leaders Licensure Assessment test. Candidates for assistant principal positions may have a provisional principal's license, whereas principals must have an unconditional license.[8] As a result, one would expect most, if not all, school administrators to have a master's degree.

To support the development of high-quality administrators, the North Carolina General Assembly began funding a Principal Fellows Program in 1994 to assist individuals in acquiring the necessary schooling for a career as a principal or assistant principal. The fellows take a two-year leave of absence from their home districts and enroll as full-time students in a Master's of School Administration (MSA) degree program at one of the University of North Carolina campuses. The assembly pays the fellows $20,000 a year to cover tuition and living expenses. In the second year, fellows participate in an internship program within a public school for an additional stipend. After the fellow has completed his or her degree, he or she must work as a full-time administrator in North Carolina for a minimum of four years or repay the fellowship plus 10 percent interest.[9]

School Finance

The financing of North Carolina public schools is split between the federal, state, and local governments. The state provides 70 percent of the funding, the federal government provides 8 percent, and local governments provide the final 22 percent. North Carolina is unusual in the way it splits funding responsibilities between the state and local governments in that the state shoulders much more of the burden. Nationally, states provide on average 51 percent of schools' budgets, with local communities providing 42 percent.

In 1997, the North Carolina Supreme Court ruled, in *Leandro v. North Carolina*, that local funding inequality was constitutional.

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[8] http://www.ncpublicschools.org/Employment/admin_license.html.
[9] http://www.wssu.edu/alumni/ncprin.asp.

Between the time of the ruling and 2002, the gap between the highest and the lowest spending counties grew 62.6 percent, reaching $2,643 per child. The disparity in taxable real estate capacity--the main source of local funds--grew even faster in this period: 54.2 percent. The state has enacted Low-Wealth and Small-County supplemental funds to help lessen the disparities between counties, spending $113 million in 2000—2001 on 73 counties to increase their per-pupil funding by an average of $158 (Poteat et al., 2003).

North Carolina public schools spent, on average and adjusted for regional differences, $6,570 per pupil in 2001. This places North Carolina in the lower third of states in terms of school spending; it stands at 37 in a ranking of the 50 states.[10]

Perhaps because state spending dominates local spending in North Carolina for education, the state had the ninth-smallest gap in per-pupil spending between the highest and lowest spending districts in 2000.[11]

Compensation and Retirement Benefits

As of July 1, 1995, the tenure system for administrators in North Carolina was abolished. Currently, all administrators sign contracts for two to four years (although the initial contract may be shorter) that are then renewed by the local school board on the superintendent's recommendation. If the superintendent decides not to recommend renewal of an administrator's contract, the administrator is given notice of the decision and has an opportunity to appeal to the local school board. The school board's decision on an appeal is subject to judicial review. If the administrator previously held career status as a teacher and remains in the local school administrative unit where that status was earned, he or she retains that status if the contract as an administrator is not renewed (North Carolina Benefits Manual, §14.3.1—6). These tenure rules seemingly limit the mobility of school administrators, since it is substantially more risky for an

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[10] http://www.stateline.org/stateline/?pa=fact&sa=showAllFacts#issue124.

[11] http://www.stateline.org/stateline/?pa=fact&sa=showAllFacts#issue124.

administrator to take a position in a district other than the one where he or she previously held career status as a teacher.

North Carolina is a right-to-work state, so the teachers' association, North Carolina Association of Educators, is relatively weak. It is "an all-inclusive association with all categories of professional school personnel eligible for membership," and it currently has approximately 70,000 members.[12]

As discussed earlier, compensation for educators and principals in North Carolina is determined through a statewide salary schedule based on position, education, certification, experience, and bonuses for meeting statewide goals, potentially combined with a supplement paid by the local education agency.

North Carolina principals are not particularly well paid relative to their counterparts in other states, but the salary differential between principals and teachers in North Carolina compared with other states is about average (Gates, Ringel, and Santibañez, 2003). Thus, one might expect salary issues to lead to more supply problems in North Carolina than in other states. North Carolina has a statewide retirement system, something that should foster interdistrict mobility. The retirement systems for public school personnel allow for full retirement at any age for those with 30 or more years of service, so individuals who begin their careers as teachers in the North Carolina system in their early 20s are approaching retirement eligibility in their early 50s.[13] Thus, one might expect to see high rates of departure among individuals in their mid- to late 50s.

State Education Reforms

Statewide education reform initiatives may have an important effect on the working conditions of school administrators and may influence the supply of administrators. North Carolina was a leader in the accountability reform movement of the 1990s. Under the leadership of Governor Jim Hunt, a series of reform initiatives were put into place beginning in the early 1990s. Curriculum-referenced tests were

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[12] http://www.ncae.org/structure/beliefs/ncaehi.shtml.

[13] http://ncdst-webt.treasurer.state.nc.us/RET/frbenhand.htm.

introduced statewide in the 1992—1993 school year. In addition, teachers' salaries were raised to be on a par with the national average, and standards of accreditation for teacher education programs were raised (Ladd and Zelli, 2001, p. 6).

Part of the reform initiative was a push to increase the number of National Board certified teachers.[14] The main benefit for these certified teachers is a salary differential of 12 percent of their state salary for the life of their certification (10 years). Because the certification offers such a boost in salary, a main concern is that the most talented teachers will choose to pursue certification rather than moving into administration.[15]

The centerpiece of North Carolina's school reform is its "ABCs of Public Education" program (State Board of Education, Department of Public Instruction, n.d.). The ABCs focus on three goals: Accountability, teaching the Basics, and allowing maximum local Control. The program was piloted in ten local districts in the 1995—1996 school year and then introduced statewide for elementary and middle schools the following year. The high school program was introduced in 1997—1998. The model continues to evolve as the state fine-tunes the program and targets new areas of reform.

The accountability provisions set growth and performance standards for every school in the state, using primarily end-of-grade (EOG) and end-of-course (EOC) test results to measure each school's growth and performance. Expected growth targets are set for each school using a formula that takes into consideration the school's previous performance, statewide average growth, and a statistical adjustment. If a school does not meet its expected growth standard and has significantly less than half its students at or above grade level, it is designated as a low-performing school. Principals of these low-performing schools may be dismissed or demoted at the recommendation of

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[14] National Board certification is a widely admired teaching credential issued by the National Board for Professional Teaching Standards (NBPTS). The first eight North Carolina teachers to receive this certification did so in 1994. Since then, the number has grown to more than 5,100 in North Carolina--approximately 6 percent of the state's teaching force.

[15] http://www.ncpublicschools.org/nbpts.

a state-assigned assistance team or the superintendent. A
superintendent is required to submit a plan for addressing the needs of
the low-performing schools in his or her district. If more than half of
the schools in a district are designated low-performing, the state
board may appoint an interim superintendent to improve the performance
of schools in the district.[16]

REPORT ORGANIZATION

Our first three primary research objectives form the structure for
this report, and the fourth objective is addressed through a synthesis
of insights gleaned from addressing the first three. In Chapter 2, we
provide a descriptive overview of current and former school
administrators and their careers, addressing the first research
objective. We then discuss our multivariate analyses. In Chapter 3, we
describe our modeling approach. (Individuals not interested in this
technical detail may wish to skip Chapter 3.) Chapter 4 summarizes the
results of the multivariate analyses, addressing the second and third
research objectives. Chapter 5 provides a discussion and conclusions,
and addresses the fourth research objective.

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[16] http://www.ncpublicschools.org/abcs/ABCsHist.html#overview.

2. DESCRIPTIVE ANALYSIS OF NORTH CAROLINA ADMINISTRATORS

The richness of the state-level data for North Carolina proved to be both a blessing and a curse. Because we had data on the entire population of educators and administrators in the state's public education system over the course of many years, there were many different comparisons to make, cross-tabulations to calculate, and trends to explore. We examined trends over time for the demographic characteristics of school principals, assistant principals, other administrators,[1] and superintendents.[2] We explored overall trends in the number of school administrators as a reflection of the demand for school administrators. And because public school educators and administrators in North Carolina are eligible for retirement at a relatively young age, we explored trends in the age of school administrators.

Moreover, because, as mentioned in Chapter 1, policymakers may be interested in issues of gender equity and racial/ethnic diversity for school administrators, we explored trends in these areas as well. We then focused on school principals and superintendents, examining the positions these individuals held before entering the principalship or superintendency, our goal being to identify typical career paths and whether they had changed over time. An analysis of career paths can, among other things, help inform whether schools and districts are

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[1] The term *other administrators* includes individuals with positions in the following categories in the personnel file: financial officer, director, and other administrator. A financial officer is a person who manages fiscal operations of the local school administrative unit in the area of budgeting and financial accounting. A director is someone assigned to direct or supervise staff members, a function, a program, or a supporting service. People in the category of other administrator are those required to perform management activities not classified as belonging to any of the other categories--i.e., persons not classified as one of the following: superintendent, associate superintendent, assistant superintendent director, supervisor, principal, financial officer, or assistant principal.

[2] For this analysis, we grouped assistant and associate superintendents with school district superintendents. We reasoned that all positions with the designation "superintendent" are high-level and visible.

grooming administrators through structured career paths over a long period or are hiring individuals who are new to the system. Finally, we examined the positions held by first-time, or new, principals in the years following their assumption of the principalship in order to provide an initial sense of how much turnover there is in North Carolina school leadership positions.

This descriptive overview highlights issues worthy of further consideration through multivariate analysis. We do not discuss the implications of trends here, however. Those and the combined insights from the descriptive and the multivariate analyses are discussed in Chapter 5.

As part of our descriptive analysis, we examined a wide variety of cross-tabulations that included school and regional characteristics as well as the individual characteristics of school administrators. We highlight in this report only the most interesting trends and sources of variation.

CHARACTERISTICS OF NORTH CAROLINA SCHOOL ADMINISTRATORS

Figure 2.1 illustrates the trends in the number of school administrators in the state of North Carolina. Between 1987 and 2001, the total number of school administrators increased by 61 percent, which contrasts with the 46 percent growth in the number of teachers in the state. The growth was not evenly distributed across administrative positions, however. The number of superintendents decreased by 16 percent, the number of school principals increased by a modest 11 percent, the number of other administrators increased by a whopping 220 percent, and the number of assistant principals increased by 64 percent. North Carolina has been moving toward a situation in which there is one assistant principal for every principal: The ratio was 0.67 to 1 in 1987, but had grown to nearly 1 to 1 by 2001.
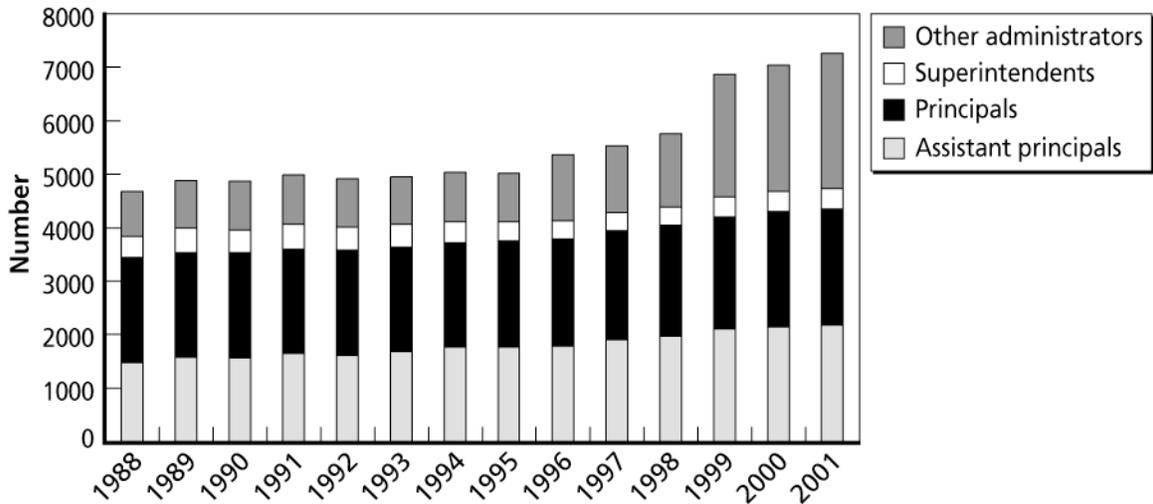
Figure 2.1—Number of Administrators in North Carolina, by Type and Year

When we compared the population averages for the different groups of school administrators—all principals, first-time principals, assistant principals, other administrators, and superintendents—for 1990 and 2000, we found increases in average age, proportion of population over 50 and over 55, percentage of females, and percentages of minorities in each category. (Tables A.1 through A.5, in Appendix A, summarize, respectively, the demographic characteristics of these five groups of school administrators in North Carolina.)

The Average Age of Administrators in North Carolina Has Increased

Between 1990 and 2000, the average age of all categories of school administrators in North Carolina increased, mirroring trends in the North Carolina teacher workforce. This is expected, because nearly all administrators have some teaching experience—teachers form a pool of potential school administrators. During this same period, the age distribution of all principals and first-time principals in the state shifted to the right, reflecting the aging trend. The age distribution in 2000 was also more spread out than the age distribution in 1990. (Figures A.1 and A.2 present the age distributions for, respectively, all principals and first-time principals in 1990 and 2000.)

As was found to be true for the nation as a whole (Gates, Ringel, and Santibañez, 2003), the fraction of all principals over age 50 and

the proportion of first-time principals over 50 increased. By 2000, 40
percent of all principals and 22 percent of first-time principals were
over age 50 (see Tables A.1 and A.2). This increase in the average age
and the proportion of administrators over 50 holds for the other
categories of school administrators as well (see Tables A.3 through
A.5). We focused on the proportion of administrators over age 50, since
these are the individuals nearing retirement eligibility. We observed
no dramatic differences in the average age of principals by school
characteristics or community characteristics in North Carolina.

Women Make Up a Growing Fraction of the State's School Administrators

The proportion of women in each administrative group has increased
over time (again, see Tables A.1 through A.5). Women are now a majority
of other administrators, assistant principals, and first-time
principals, and they are now 29 percent of superintendents. In spite of
this steady growth in their numbers, however, the proportion of
administrators who are female still remains below the proportion of
teachers who are female.

Figure 2.2 illustrates the trends for female administrators in
North Carolina, focusing specifically on principals. As can be seen,
there was steady growth in the number of female principals between 1990
and 2000: In 1990, only 26 percent of North Carolina principals were
female; but by 2000, 46.6 percent--nearly a majority--were. This trend
is supported by a similar increase in the proportion of new principals:
By 2000, 50 percent--a clear majority--were women, up from 44 percent
in 1990. This suggests that the trend in the proportion of all
principals that are female should continue. The trend of increasing
female representation in the principalship is evident at each grade
level, as well (see Figure A.3), although the fraction of female
principals in elementary schools is over twice as large as that in high
schools. Women are a majority of the principals in elementary schools
(58 percent), but are a lower percentage in middle, combined-grade
schools, and high schools (41, 35, and 24 percent, respectively) in
North Carolina.

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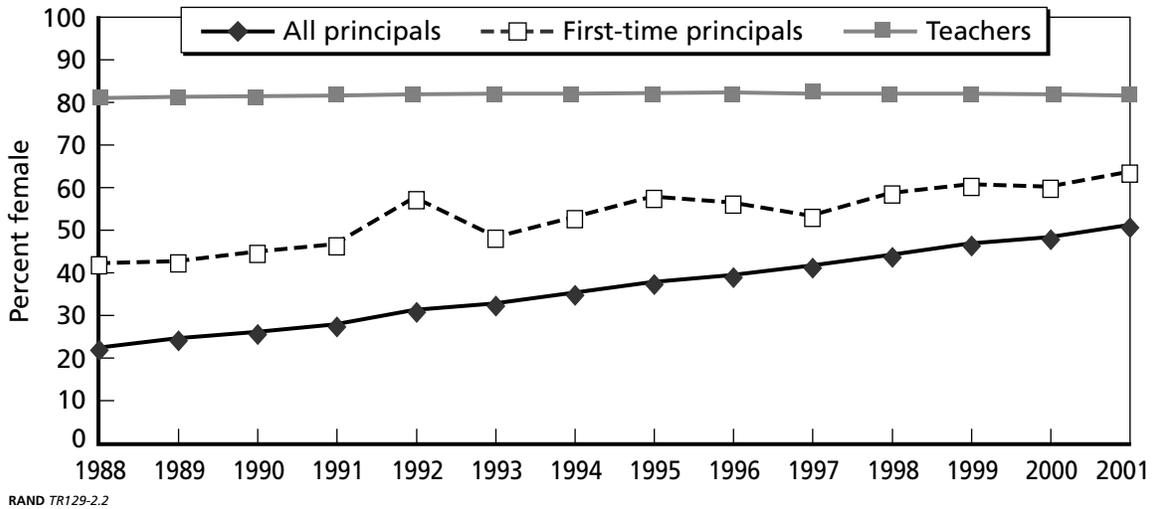
Figure 2.2—Proportion of North Carolina Principals and Teachers That Are Female

There is slight variation by urbanicity in North Carolina. Fifty-nine percent of urban school principals are women, compared with 50 percent of suburban and 41 percent of rural school principals.

The Proportion of Administrators That Are Minority Has Increased

With the exception of the superintendency, where the proportion of whites declined from 87 to 81 percent between 1990 and 2000, there was only slight growth in the proportion of minority school administrators (see Tables A.1 though A.5). As Figure 2.3 shows, the proportion of principals that are members of a racial or ethnic minority in North Carolina also increased over time, although not as much as was true for women. This primarily reflects changes in the proportion of African-American relative to white principals, since the numbers of Hispanic, Asian, and American Indian administrators are extremely small in North Carolina.[3] In 1990, 22 percent of North Carolina principals were members of a racial/ethnic minority; by 2000, 24 percent were. However, information on first-time principals and teachers suggests that it will be challenging for North Carolina to maintain this limited trend. Two

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[3] In 2000, the proportions of these groups among principals were 0.1, 0.1, and 1.0 percent, respectively.

points are worth emphasizing. First, the proportion of first-time
principals who are minority is now similar to the proportion of all
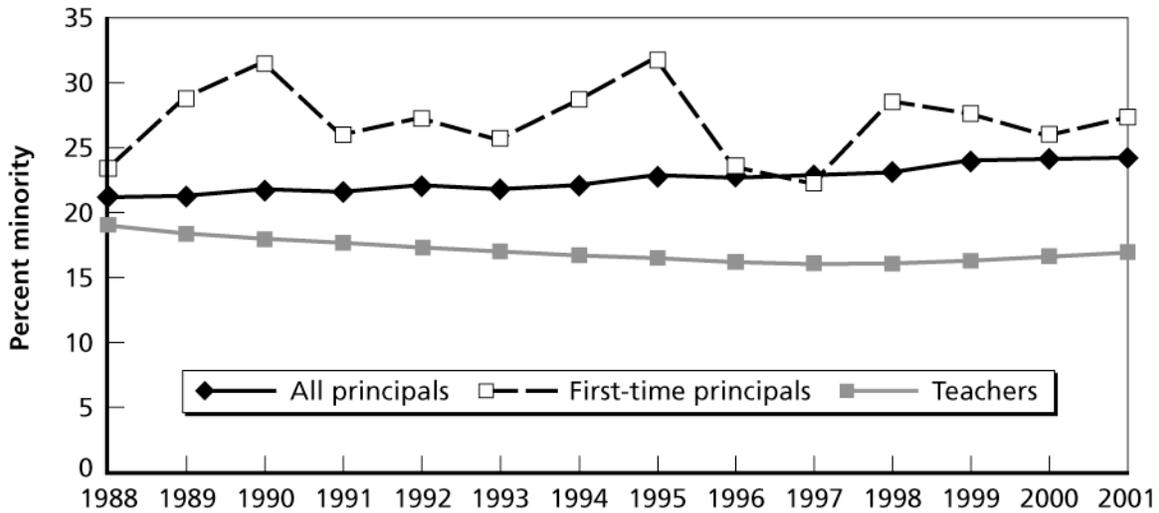
RAND *TR129-2.3*

**Figure 2.3—Proportion of North Carolina Principals and Teachers That
Are Minority**

principals who are minority. Second, the proportion of all and first-
time principals who are minority exceeds the proportion of teachers in
the state who are minority, and the proportion of minority teachers has
declined over time—from 18 percent in 1990 to 16 percent in 2000.

　　We found that minorities are a slightly larger proportion (31
percent) of middle school principals, and a slightly smaller proportion
(12 percent) of combined-grade school principals (see Figure A.4). We
also found that minority principals are overrepresented in urban
schools (32 percent), but still make up a substantial proportion in
suburban and rural schools (17 and 19 percent, respectively). In
addition, minority principals are overrepresented in schools with high
minority student enrollment, and are underrepresented in large schools.

DESCRIPTION OF CAREER PATHS INTO THE PRINCIPALSHIP

　　For each individual who assumed the principalship, we examined the
path he or she had taken to get there. Across the population, there
were literally hundreds of options, particularly when we considered the
order in which the various positions were held. Some individuals, for

example, moved back and forth between teaching and administrative positions other than the principalship before assuming the principalship. To succinctly summarize the career path possibilities, we focused on whether an individual had ever held a position (e.g., assistant principal) before becoming a principal, rather than the order in which individuals had held such positions. We also grouped the various positions an individual might hold into four categories: teacher, assistant principal, other administrator, and principal.

We examined the paths followed by each cohort of first-year principals.[4] However, because we observed no clear trends across cohorts, what we present here are averages, pooled across all cohorts from the 1987–1988 through 1999–2000 school year.

The categories we used are mutually exclusive and reflect whether the individual held all of the positions mentioned at some point in his or her career. (See Figure A.5, which reflects career paths followed by first-time principals.) If a person was observed in our data set as not having held another position in the state of North Carolina education system before becoming a principal, we classified that person's path as "principal." The "assistant principal, principal" path includes people who were never observed as teachers in the North Carolina public schools but were observed as assistant principals and then principals. "Teacher, assistant principal, principal" was the defined path for people observed as both teachers and assistant principals in North Carolina at some point before becoming principals. Finally, "teacher, principal" was used for people who had never served as an assistant principal before moving from teaching to the principalship. Individuals that had served in an administrative capacity other than assistant principal before becoming a principal were described as "other."

The career path we found to be the most common for North Carolina principals was that of "teacher, assistant principal, principal."

We also looked at career path by school size (see Figure A.6).[5] We defined small schools as those in the lowest quartile in terms of

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[4] That is, by each group of individuals assuming the principalship for the first time in a given year.

[5] The school characteristics discussed here are those of the schools where the first-time principals worked.

enrollment (under 375 students), medium schools as those in the two middle enrollment quartiles (375 to 750 students), and large schools as those in the top enrollment quartile (over 750 students). Not surprisingly, those whose first principalship was at a larger school were most likely to have served as an assistant principal first.

The number of people who assumed a principalship without being observed to have served as a teacher in the data set was higher than national data would suggest. We found that 8 percent of North Carolina principals had not served as teachers prior to assuming the principalship, whereas over 99 percent of principals at the national level had some teaching experience. This disparity may be explained by the differences between the national data and our data. The national figure is based on surveys of principals in which they were asked whether they had teaching experience. Our data are based on administrative records and reflect only whether these principals had teaching experience within North Carolina public schools. The principals in these categories may have obtained teaching experience outside of the state of North Carolina, or in North Carolina private schools.

COHORT ANALYSIS OF FIRST-TIME PRINCIPALS

The other descriptive analysis we performed was a detailed examination of what happens to people who become principals. Do they remain in their position for a long time? Do they move on to other administrative positions? Do they move to other schools or districts? This analysis addressed a variety of questions related to principal mobility.

We examined information on individuals who entered the principalship for the first time between the 1987–1988 and the 1991–1992 school year, and we considered what they were doing six years after their first year as a principal. We categorized the possibilities into nine different options in our analysis: principal in the same school, principal in a different school in the same district, principal in a different school in a different district, other administrative position in the same district, other administrative position in a

different district, teacher in the same district, teacher in a
different district, other, and left the North Carolina system.
Figure 2.4 summarizes the statewide results for first-time principals.[6]
This figure reveals that after six years, just under half (48 percent)
of the new principals were still principals in the state of North
Carolina. And of those who were still principals in the state public
system, the majority had moved to other schools: 21 percent remained in
the same school, 9 percent became principals in a different district,
and 25 percent moved to a new school in the same district. Sixteen
percent of new principals were teachers six years later, 14 percent had
assumed some other administrative position, and 14 percent had left the
North Carolina system completely.

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[6] This figure combines "teacher in the same district" with "teacher
in a different district" and "other administrator in the same district"
with "other administrator in a different district." We found that,
statewide, those who move to teaching are much more likely to stay
within the same district (73 percent), as are those who move from a
principalship to "other administrator" (71 percent).
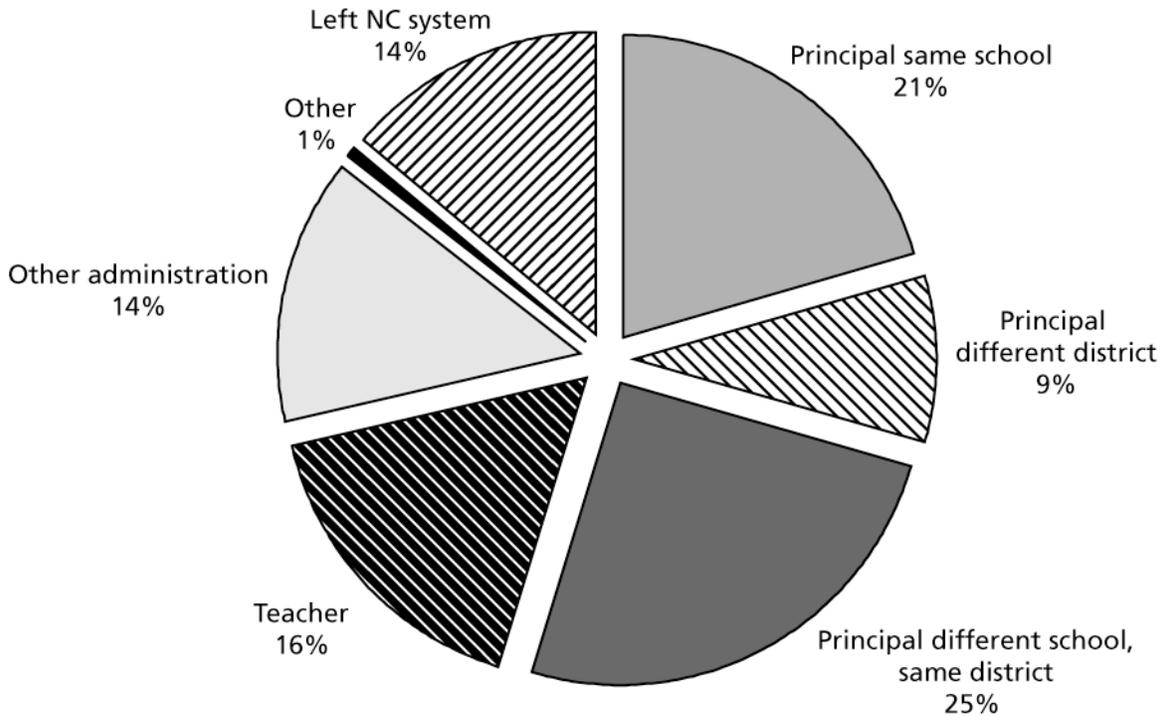
RAND *TR129-2.4*

Figure 2.4—Position Held Six Years After First Principalship in North Carolina, 1987—1993 Cohorts, Statewide

SUMMARY

We found that, consistent with national trends, the average age of all teachers and school administrators in North Carolina increased over the last decade. Similarly, the age distribution of all principals and first-time principals shifted to the right and became more spread out, suggesting that schools and districts may have changed their hiring behavior with respect to principals and opened their consideration to individuals at both older and younger ages.

Although North Carolina's proportion of female school administrators remained lower than its proportion of female teachers, female representation among school administrators increased consistently over time and across all administrative positions. Different patterns were evident for minority administrators, however. Minority representation among administrators increased more modestly over time, but the proportion of minority administrators remained greater than the proportion of minority teachers. This raises concerns for those who hope the trend of more minority representation in

administrative positions can be sustained or amplified. Our analysis of career paths revealed that teaching is the gateway to school administration positions, which, when coupled with the fact that the proportion of minority teachers in North Carolina has been on the decline, suggests fewer minority members will become administrators.

Our analysis of the subsequent career choices made by first-time principals suggests a fair amount of mobility among principals. After six years, just over half of first-time principals were still principals, and a fair number of principals had returned to teaching or had left the public school system entirely.

One sense in which these data suggest potentially different conclusions from those of the national study (Gates, Ringel, and Santibañez, 2003) is reflected in Figure 2.1. In examining data on the number of school principals, the authors of the national study concluded that growth in the number of school administrators has been relatively modest. However, the state-level data for North Carolina reveal that, even though the numbers of school principals and superintendents have increased modestly or even decreased, the total number of administrators has, indeed, increased over time, due to substantial increases in the number of other administrators and assistant principals. This suggests that North Carolina has dealt with the pressures of population growth by increasing the amount of administrative support available to existing schools and districts rather than by dramatically increasing the number of schools and districts. The fact that schools and districts are increasingly assigning administrative duties and positions to individuals who are not principals and superintendents argues for a better understanding of the roles these other individuals are playing in the school and district context.

This descriptive information serves as a springboard for the multivariate analyses contained later in this report. Through multivariate analyses, we were able to look beyond specific cross-tabulations and better understand the subtleties of the career paths of North Carolina school administrators. Specifically, we focused on two key transitions: the transition from teaching to administration, and the turnover among current administrators. In exploring these

transitions, we concentrated on the issues of potential interest to policymakers (see Introduction). In the next chapter, we describe our methodology for analyzing the administrative data to better understand these issues.

3. METHODOLOGY FOR EXAMINING CAREER TRANSITIONS

This chapter describes the methods we used to explore some of the insights suggested by the findings of our descriptive analysis. The analyses discussed here reflect a first attempt to exploit the rich longitudinal state-level data so as to better understand career transitions. We focused on two types of transitions: the transition from teaching to school administration, and the transition from the principalship. Rather than exploring specific hypotheses related to these transitions, our objective was to examine whether observable characteristics of individuals or the schools in which they work are related to the probability of different career transitions.

There are plenty of economic studies examining career transitions in other settings. First, and perhaps most closely related, is the literature on teacher turnover. Most studies of teacher retention focus on "staying in teaching" and thus treat moves into school administration as attrition. For example, in her analysis of teachers who interrupt their careers, Beaudin (1993) treated teachers who left the classroom as turnover. She used a maximum likelihood methodology to estimate what teacher characteristics predict turnover. The analysis used a sample of newly hired full-time teachers in the Michigan public school system in the mid-70s to mid-80s to see which ones were likely to return to teaching. The dependent variable in this study was a dichotomous variable indicating whether a teacher returned to public school (full-time) teaching or not. Boe et al. (1997), in their analysis of data from the 1987—1988 Schools and Staffing Survey (SASS) and the 1989 Teacher Follow-up Survey, analyzed the personal and school variables that predicted teacher retention, transfer, and attrition. Their methodology consisted of chi-square tests of associations between variables. The dependent variable included three status categories measured one year after initial survey response: retention in the same school, transfer to a different school, or attrition from teaching. They treated any teacher who was not teaching in the same school or a different school during the next year as a loss to the system.

In their study of Texas schools, Hanushek, Kain, and Rivkin (2001) were also primarily concerned with teacher mobility, so they, too, considered a move out of teaching to be a loss to the system. They used a logistic framework to examine the probability of leaving a particular district as a function of teacher characteristics. In addition, they use a multinomial logistic framework to account for three different mobility decisions: stay at the current school, move to another school/district, exit the public school system altogether. Their study defines attrition as those teachers who left teaching or left the public school system to teach at a private school or in another state. The authors do not make it entirely clear whether moving to an administrative position is considered leaving the Texas public school system; but, because the other two outcomes involve continuing to teach at the current school or moving to teach at another school, it is very likely that moves into administration were considered exits to the system.

One exception to this way of categorizing teacher attrition is Brewer (1996), who does not define teachers who move into administration as a loss to the system. He used a discrete time hazard model to estimate the likelihood of quitting teaching in a particular district. In his model, a quit is defined as occurring when a teacher changes districts or exits the sample. Teachers who move into administration in the same district are treated as nonquitters. This broader definition of teacher attrition is to be expected in this study, given that Brewer was focusing precisely on the variables that influence a quit from teaching and a move into administration.

Other studies have looked at the amount of time it takes individuals to make transitions of different types in a wide range of settings. The most popular approach is the simple hazard model, which focuses on one particular outcome (such as leaving teaching) and examines the factors related to either the event's occurrence or the time until the event occurs. This approach is used when there is one

outcome of interest.[1] Another approach is the competing risks model, which examines either the time it takes for an individual to experience one of several possible events or the probability of occurrence of the different events. This approach is used when there are two or more events of interest and there is a perceived value to examining those events simultaneously.[2]

For our purposes, the competing risks framework makes more sense. In analyzing the transition to school administration, we know that teachers may remain as teachers, leave the system entirely, or become administrators. Observable characteristics of schools and districts may have different relationships to these different outcomes. We want to allow for this full range of outcomes in order to fully understand the factors related to the transition to administration. Similarly, in the case of the transition from the principalship, an individual may leave a principalship to take another principalship, to take another job in the education system, or simply to leave the system altogether. We were seeking to understand the relationship between observable characteristics of individuals and schools and those different transitions.

Characteristics of our data and the nature of the transitions we examined drove our specific modeling choices. Although it is common for competing risks hazard models to analyze specific entry cohorts and estimate the time it takes until different events occur, we were more interested in the probability that individuals in the population experience a particular transition in a particular year, regardless of their cohort, than we were in the time it takes individuals to make different transitions. There were also practical considerations that limited our ability to explore duration. The average first-time principal has nearly 15 years of experience, and the range in the level of experience for first-time principals is quite broad. To fully

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[1] For example, Han and Hausman (1990) examined the duration of unemployment spells, focusing on the transition from unemployment to employment.

[2] Spurr and Sueyoshi(1994) examined the promotion and quit hazards of lawyers; Ehrenberg and Mavros (1995) examined doctoral students' degree completion and dropout rates.

analyze duration, one would have to examine an entry cohort over 20 or more years. Therefore, we eschewed a cohort approach, instead choosing one based on the entire population.

We used a multinomial logit model to examine

- The transition from teaching to the principalship;
- The transition from teaching to the superintendency;
- Principal mobility and turnover.

Recognizing that the assistant principalship is a common stepping stone to the principalship, we considered two different models of the transition to the principalship. The first describes the factors influencing the probability that an individual educator in the North Carolina public school system eventually becomes a principal. The second explicitly considers two potential transitions: from teaching to the assistant principalship, and from the assistant principalship to the principalship.

Table 3.1 summarizes the four models, describing the risk pool for each model and the possible outcomes under consideration.

MODELING APPROACH

To implement the competing risks framework, we used a longitudinal event history model. Longitudinal event history analysis—a regression approach in which the occurrence of specific events of interest is dependent on explanatory variables (Allison, 1984)—has several key features. First, for each model there is a risk pool, which consists of the population of individuals who are in a particular state or category of interest at time t. In our case, these are the individuals who are at risk of making a transition between time t and time t+1. The model must also specify some number of states or categories in which an individual in the risk pool might find himself or herself at time t+1. The analysis focuses on understanding the factors that influence the probabilities that an individual makes the different transitions between time t and t+1.

Because we only know the year, and not the precise moment in time, in which an event (e.g., promotion) occurs, time is measured on a discrete scale. Therefore, we must use a discrete-time version of the

longitudinal event history model. The standard approach for estimating
the discrete time logistic competing risks model is the multinomial

Table 3.1

Summary of Analytical Models

Model	Risk Pool	Possible Outcomes
Transition to principalship	All North Carolina educators who began as teachers and are not principals or superintendents at time t	• Leave system • Remain in system but do not become a principal • Become a principal
Two-stage transition to principalship, stage 1	All North Carolina educators who are not assistant principals, principals, or superintendents at time t	• Leave system • Remain in system but do not become an assistant principal or a principal • Become an assistant principal • Become a principal
Two-stage transition to principalship, stage 2	All North Carolina assistant principals at time t	• Leave system • Remain in system but do not become a principal • Become a principal
Transition to superintendency	All North Carolina educators who are not superintendents at time t	• Leave system • Remain in system but do not become a superintendent • Become a superintendent
Transition from principalship	All North Carolina principals at time t	• Leave system • Remain a principal in same school • Remain a principal but change schools • Remain in system but not as a principal

logit model (Allison, 1982). The multinomial logit approach also
effectively addresses both of the problems of censoring and time-
varying covariates, as described below.

In discrete time, the hazard rate is the probability that an event
will occur at a particular time to a particular individual, given that
the person is in the risk set at that time. In the specific case of the
model of transition to the principalship, the probability of
transitioning to the principalship within a particular year for those

who have not yet become a principal--i.e., those who are still "at risk"--is an example of a hazard rate.

The discrete time model specifies how the hazard rate depends on explanatory variables. We denote the hazard by p(t), the probability that an individual has an event at time t, given that the individual is still at risk at time t. With, say, two explanatory variables—x_1, which is constant over time (e.g., gender), and $x_2(t)$, which is time varying (e.g., experience)—the standard model for a single event uses a logit transformation of p(t) as the outcome, with the hazard at time t varying with the intercept $\alpha(t)$, the time-invariant explanatory variables, and the time-varying explanatory variables $x_2(t)$,

$$log(p(t)/1-p(t)) = \alpha(t) + \beta_1 x_1 + \beta_2 x_2(t) \ \ .$$

Thus,

$$p(t) = (1 + exp(-\alpha(t) - \beta_1 x_1 - \beta_2 x_2(t))^{-1} \ \ .$$

Here, $\alpha(t)$ refers to a different constant for each year; the constants are simply estimated by including a dummy for each year.

APPLYING THE MODEL TO OUR PROBLEMS

To estimate the unknown parameters of this model, the data need to be set up accordingly and then fit using a multinomial logit routine. For each unit of time that each individual is at risk, a separate observation record is created. In the case of the first model of transition to the principalship, the dependent variable is coded as 1, 2, or 3 for each person-year, depending on the individual's state in the next period.[3] The explanatory variables take on their assigned

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[3] Note that individuals were dropped from the analysis only if they never appeared in the data set again. For example, if an individual that was in the data set in 1987 was not in the data set in 1988, 1989, and 1990, and then reappeared in 1991, he/she was recorded as follows: in the risk pool for 1987, treated as "stay as is" (since he/she eventually came back); not in the risk pool for 1988, 1989, and 1990; and included in the risk pool again in 1991. For North Carolina, only 4 percent of our person-year observations had such gaps. We had 7,148 observations with a gap of one year or more: 40 percent were one-year

values in each person-year. The final step is to pool all person-years into a single sample and then estimate a multinomial logit model for a categorical dependent variable using the method of maximum likelihood.

Teachers whose time to principalship is censored contribute exactly what is known about them--namely that they did not transition in any of the years they were observed. Time-varying covariates are easily included because each year at risk is treated as a distinct observation. The covariates and outcomes are conveniently measured at the same time in our application. Thus, this data setup and model appropriately address the issue of right censoring--i.e., the fact that the data end before a transition to the principalship can be made by some individuals. The issue of left censoring--i.e., the fact that we do not observe people who were at risk of becoming a principal before the earliest date recorded in the data--is dealt with through the inclusion of variables for age and experience.

Multinomial logit models simultaneously examine the probability that the individual ends up in each of the possible end states and describe the odds of response in one category instead of another. The probability of being in each response category is described relative to a baseline category.

Let 1 be the baseline category, and let 0, 2, and 3 be the other categories. Then the baseline-category logits are given by

$$\log\left(\frac{\Pi_j}{\Pi_1}\right) \qquad \text{for } j = 0, 2, 3 \quad .$$

The logit model using the baseline-category logits with predictors

$$x_1, \dots x_5$$

has the form,

$$\log\left(\frac{\Pi_j}{\Pi_1}\right) = \alpha_j + \beta_{j1}x_1 + \dots + \beta_{j2}x_2 + \beta_{j3}x_3 + \beta_{j4}x_4 + \beta_{j5}x_5 \quad ,$$

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gaps, 18 percent were two-year gaps, 10 percent were three-year gaps, and 32 percent were gaps of four years or more.

and

$$\left(\frac{\Pi_j}{\Pi_1}\right) = \exp(\alpha_j + \beta_{j1}x_1 + ... + \beta_{j5}x_5) = e^{\alpha j}e^{\beta_{j1}x_1}...e^{\beta_{j5}x_5} \quad .$$

In the equation above, the quantity on the left-hand side is the odds ratio. Note that in the multinomial logit model, the odds ratio is defined with respect to the baseline category. Thus, the estimated odds ratio of category j = 2 and category 1 (above) represents the probability of event j (say, j = 2, dropping out) relative to the probability of the baseline category (say, staying in the system in some capacity other than as a principal).[4] The model above also provides the effect of individual predictors on the estimated odds. Thus, when there is a unit increase in x_1, the odds increase multiplicatively by $e^{\beta j1}$.

The predicted response probability of category j is given by

$$\Pi_j = \frac{\exp(\alpha_j + \beta_{j1}x_1 + ... + \beta_{j5}x_5)}{\sum_h \exp(\alpha_h + \beta_{h1}x_1 + ... + \beta_{h5}x_5)}$$

where j = 2, 3, and h = 1, 2, 3. To get the predicted probabilities for, say, category 2, substitute the regression coefficients for category 2 from the baseline-logits model in the numerator, while the denominator is simply the sum of the numerator across all categories. Thus, the denominator is the same for each probability, and the sum of the numerators for the various j equal the denominator, so

$$\sum \Pi_j = 1.$$

The values of α and β are set to 0 for the baseline category. Thus, the numerator for the baseline category (category 1) in the equation above is 1 because exp(0) = 1.

These calculations can be performed using any category or outcome as the reference category.

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[4] Most software computes confidence intervals for these odds ratios.

Assumptions

In our data set, right censoring occurs at the same time (year 2001), but individuals enter the school system at different times. In our case, individuals who enter the system later are more likely to be censored. When the censoring is random, most event history methods assume that the censoring times are independent of the times at which events occur, or an independence model. Sensitivity analyses can be performed to test whether the independence model is appropriate. However, our decision to censor at 2001 depended on the data and not on any information about when events occur, supporting the assumption of independence.

Another assumption of the multinomial logit model is the independence of irrelevant alternatives (IIA), which states that the relative probability of any two outcomes is not altered by the inclusion of other possible outcomes. In our case, this implies that the relative probability of becoming an administrator and remaining in teaching is not affected by whether we consider dropping out as another possible outcome. We might be concerned, for example, that unobserved characteristics of individuals that make them more likely to drop out also make them more or less likely to become principals if they do not drop out.

A test for the IIA assumption, based on Hausman and McFadden, 1984, is available in Stata.[5] The premise of the test is that if IIA is a valid assumption, then dropping one category from the model should not change the estimated coefficients. Applied to each of the four models using the North Carolina data, the test supports the validity of the IIA assumption in our application.[6]

In the models, we are interested in understanding the relationship between the individual characteristics of the principal and the

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[5] http://www.stata.com.

[6] Because one of our outcomes ("stay as is") is a nonevent, and individuals who experience that outcome are fed into the risk pool for the next year, we focused on the test statistics generated when the "events" (e.g., leave the system, become a principal) are removed from the model. Removing the outcome "stay as is" from the model resulted in a complete transformation of the structure of the data set in subsequent years.

characteristics of the schools (or, in the case of the superintendent
model, the districts) in which they are working on the probability of
various transitions. We estimated two specifications of the model
because we were concerned about the possible endogeneity of school-
level or district-level variables in these models, which would occur if
the factors influencing the type of school a person takes a job in are
the same factors influencing the decision to become a principal. For
example, this would be true if people who want to be principals are
more likely to take teaching jobs in specific types of schools (e.g.,
large urban schools). To address this concern, we ran each model using
two specifications. The first included only individual-level
characteristics as explanatory variables. The exclusion of the school
characteristics presented a tradeoff: the concern regarding endogeneity
was reduced, but an omitted variables bias might be introduced. In the
second specification, we added the school-level variables to the model.
The comparison of the estimates between the two specifications provided
some information regarding the magnitude of the endogeneity and omitted
variables biases. In our discussion of the results, we focus on the
model that included school characteristics, because the inclusion of
school characteristics had little effect on the estimated coefficients
for individual-level variables. It is important to note, however, that
our models revealed more about relationships than about causality,
since teachers were not randomly sorted among different types of
schools.

Explanatory Variables

Table 3.2 summarizes the explanatory variables we included in the
four models.

The data from North Carolina lacked a measure of experience in the
school systems, so we constructed a measure. For individuals who first
appeared in the data between 1980 and 2001 and who were between 18 and
30 years of age, we created a measure based on the number of years they
were observed in the data. For those whose first appearance in the data
was 1978 or 1979, we imputed experience based on a regression formula
obtained by regressing the observed constructed measure on age, gender,
race, and the selectivity of the individual's undergraduate institution

for the subset of individuals who began after 1984 and were between 18 and 30 years of age.

The measure of minority status included in the model was an indicator for race/ethnicity. African-Americans are by far the largest minority group among North Carolina administrators. Because the number of Hispanic, Asian, American Indian, and individuals of other races/ethnicities is so small, the multivariate analysis could not support an "other race" category. Thus, we included in the analyses a dummy variable to reflect whether an administrator is African-American or not. The omitted race/ethnicity category in all regressions includes all other individuals—i.e., Hispanics, Asians, and whites—as the reference group, but the reference group is nearly 100 percent white. As a result, we often discuss the differences between African-Americans and non-African-Americans as differences between African-Americans and whites.

We used ranking from the Barron's Profiles of American Colleges (Barron's Educational Series, 1986) to measure the quality of the undergraduate institution that the individual attended. This measure is used as a proxy for unobserved individual ability. To operationalize the measure, we created two indicator variables: an indicator for having a degree from one of the most highly competitive schools, and an indicator for having a degree from a noncompetitive school. The omitted category is having a degree from a somewhat competitive college. School and district data were obtained by merging the state-level data with data from the Department of Education's Common Core of Data (CCD). This information reflects the characteristics of the school or district in which the individual was employed at the time he or she was in the risk pool (in other words, before making or not making a transition).

Exploratory analyses with a highly flexible model that included all interactions with the "female" and "African-American" indicators revealed that some of these interactions were important. Thus, the models we present were determined by testing down from a more flexible model so as to fit a more parsimonious specification.

Table 3.2

Explanatory Variables Included in the Four Models

Model	Individual Characteristics	Interaction Terms	School or District Characteristics	Interaction Terms
Single-stage model of transition to principalship	Age, age squared, gender, African-American, quality of undergrad institution, year indicators	Gender x age, gender x experience, gender x Af-Am, Af-Am x age, Af-Am x experience	School size, percent of student body that is nonwhite, indicator for principal being same race/ethnicity as plurality of students, school level, urbanicity, county wealth rank	Gender x school level, gender x urbanicity, gender x percent nonwhite, gender x wealth rank Af-Am x urbanicity, Af-Am x percent nonwhite
Two-stage model of transition to principalship	Age, age squared, gender, African-American, quality of undergrad institution, year indicators	Gender x age, gender x experience, gender x Af-Am Af-Am x age. Af-Am x experience	School size, percent of student body that is nonwhite, indicator for principal being same race/ethnicity as plurality of students, school level, urbanicity, county wealth rank	Gender x school level, gender x Urbanicity, gender x percent nonwhite, gender x wealth rank, Af-Am x urbanicity, Af-Am x percent nonwhite

Transition to superintendency	Age, age squared, gender, quality of undergrad institution, year indicators	Gender x age, gender x experience, gender x Af-Am	District size, urbanicity, county wealth rank	Af-Am x urbanicity, gender x wealth rank
Principal turnover	Age, age squared, gender, African-American, quality of undergrad Institution, urbanicity, year indicators	Gender x age, gender x experience, gender x Af-Am Af-Am x age, Af-Am x experience	School size, percent of student body that is nonwhite, indicator for principal being same race/ethnicity as plurality of students, school level, urbanicity, county wealth rank	Gender x school level, gender x Urbanicity, gender x percent nonwhite, gender x wealth rank Af-Am x urbanicity, Af-Am x percent nonwhite

INTERPRETATION OF ANALYTICAL RESULTS

The values of the regression coefficients indicate the effect of the predictor (on one outcome relative to the baseline category) after all other predictors have been controlled for; these are partial regression coefficients. The associated p-value indicates whether the regression coefficient value is statistically significantly different from zero. In summarizing the results of the regression analysis, we discuss parameter estimates as significant if the p-value is less than .05. To interpret the effect of the predictor, one can also talk about multiplicative changes in estimated odds ($e^{\beta j1}$) for unit increase in x_1.

In the multinomial logit model, the odds ratio is defined with respect to the baseline, or omitted category. In all of the models we ran, the baseline category was "remain in the risk pool," regardless of how that risk pool was defined. Thus, the estimated odds for category j (Π_j / Π_1) represent the probability of event j (e.g., dropping out) relative to the probability of the baseline category (remain in the risk pool) when the other predictors are controlled for.

Unfortunately, these parameter estimates and odds ratios do not allow for an intuitive interpretation of the results. Although we can say with confidence that a parameter estimate is statistically significantly different from zero, the magnitude of the coefficient does not provide much for intuiting how important or "big" the effect is. To get a sense of how important the results are, we examined the predicted response probability, which gives the probability of occurrence for an event. To calculate the estimated odds and predicted probability, one must select values of the covariates. The model may be used to predict values for the "average" person or for specific policy-relevant characteristics.[1]

One option for generating these predicted probabilities is to fix the values of continuous and categorical covariates at their sample means (see Lankford, O'Connell, and Wyckoff, 2003). We can similarly

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[1] These calculations are substantially more complicated for the two-stage model, because they must allow for the fact that some fraction of the population is transitioning between the two risk pools in any given year.

fix the values of the year dummy variables as the proportion of person-year records from that year to represent the distribution of records in the data set. This is what an "average" person in the existing sample may look like, because these values represent the marginal distributions of covariates in the present sample. Substituting these covariate values produces a predicted probability for an "average" person, "averaged" across all the years of the study. A similar approach to considering average probabilities is to estimate the predicted probability for each educator in the data set and average across the predicted probabilities. Either approach is valid; we calculated average probabilities using the first approach.

We were also interested in calculating probabilities in order to describe the effect of certain explanatory variables. As an example, consider the dummy variable for gender. To calculate the transition probabilities for men and women, one plugs in values of 0 and then 1 for the gender dummy variable[2] and calculates the predicted probabilities while holding all other values for the independent variables fixed at their sample means.[3] A similar approach can also be used to explore the effects of race/ethnicity, school characteristics, and year dummy variables.

In addition to this simple probability calculation, we used the three-outcome model to generate the predicted probability that an individual who is 40 years old in 1987 becomes a principal or leaves the system by 2000. This involved separate calculations for each year between 1987 and 2000. The age variable was set at 40, and the experience variable was set at the population average for 40-year-olds

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[2] Note that the gender dummy variable entered into the model directly and through interaction terms. We varied the gender dummy variable everywhere it appeared in the model.

[3] In general, the sample means of other variables also differ by gender and it is possible to calculate predicted probabilities using separate means for the different subpopulations. The approach we followed may be interpreted as reflecting a "pure" gender effect, while the alterative approach reflects the gender effect combined with the effect of population differences between men and women (e.g., women are more likely to work in elementary schools). We found that the gender differences were larger using the second approach.

in 1987; these variables were then allowed to increase each year. The year dummies were turned on and off to reflect the appropriate year.

4. SUMMARY OF RESULTS FROM THE MODELS FOR NORTH CAROLINA

We now turn to summarizing the results of the four models described in Chapter 3. As we do so, we focus on the model that includes both individual and school and/or district characteristics, and we emphasize parameter estimates that were statistically significantly different from zero with a probability of .95 or more. We also highlight any important differences between the models that do and do not include school/district characteristics. Appendix B provides supporting tables. The odd-numbered tables (Table B.1, B.3, etc.) summarize the characteristics of the independent and dependent variables used for each model, and the even-numbered tables (Table B.2, B.4, etc.) report the parameter estimates for the models and note parameter estimates that are statistically significantly different from zero.[1]

ANALYSIS OF TRANSITION TO THE PRINCIPALSHIP

In this analysis, we examined individual- and school-level factors associated with the probability that someone who begins in the North Carolina public school system as a teacher will (a) make a transition to the principalship and/or (b) leave the system. To do this, we used a discrete time competing risks model that was implemented by estimating the multinomial logit model discussed in the previous chapter with three possible outcomes: leave the system, remain in the system but do not become a principal, and become a principal. The analysis sample included all people who began as teachers in the North Carolina public school system, were not currently in a principal or superintendent position, and worked in the system between school years 1987–1988 and 1999–2000. The data were structured so that there was one observation per person per year for each year the person was in the data and had not made one of the transitions of interest (i.e., had not become a principal or left the system). In other words, once a person made a transition, he or she was dropped from the analysis sample. The model

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[1] Results of the regression analyses without school characteristics are available from the authors upon request.

contained a set of interactions with "female" and "African-American" that were found to be significant in a previous model in which all female and African-American interactions were included. Our model clustered on school to adjust the standard errors for dependency among observations associated with the same schools.

According to our results, the overall probability that a person who began as a teacher in the North Carolina school system made the transition to the principalship in a given year was 0.094 percent, but this probability varied according to individual characteristics and the characteristics of the schools in which these individuals worked. It is also informative to consider this probability at the age and experience levels that correspond to the stage in a person's career at which he or she might be expected to become a principal. We found that the probability was 2.2 percent that a person who began as a teacher in 1988, was 40 years old, and had 13.27 years of experience had made the transition to the principalship sometime between 1988 and 2000. The probability that such an individual had dropped out of the system by 2000 was 35 percent.

Gender

We found a significant negative main effect for females, and the coefficient on this variable was larger than any positive coefficient or combination of positive coefficients on the female interaction terms, which indicates that females were overall less likely than males to become a principal. In addition, the joint effect of all variables that included the female indicator was significant. When we assigned average values to all variables except the female variable and allowed the female variable to be switched on, we found that females had a 0.074 percent probability of becoming principals, whereas the same exercise with the female variable switched off produced a probability of becoming a principal of 0.33 percent for males. All else equal, this suggests that men in North Carolina are four times more likely than women to become principals.

The female-male differential was larger in wealthier counties, as evidenced by the negative coefficient on the female/wealth rank interaction. The differential was decreased by the positive effects of

a female interaction with middle schools and high schools, as opposed
to elementary schools. The female/African-American interaction was also
positive and significant. The female-experience interaction was
negative but not significant, but the interaction of female and the
squared experience term was positive and significant, suggesting that
after approximately nine years of experience (the point at which the
positive coefficient on the female-experience squared interaction
outweighs the negative coefficient on the female-experience
interaction), the male-female differential became smaller.

We found that females were slightly less likely than males to drop
out of the system. Although the main effect for females in the results
pertaining to the "leaving the system" outcome was positive and
significant, it was not large enough to dominate any combination of the
negative interaction effects, indicating that under no particular set
of circumstances did women have a lower probability than males of
dropping out. The interactions of the female indicator with high
schools and urban schools were positive and significant, whereas the
interactions of female with combined schools, percent nonwhite students
in the school, and African-American were negative and significant. The
interaction of female with age was negative until the age of 52, at
which point it became positive. The interaction of female with
experience was positive until approximately 20 years of experience, at
which point it became negative.

Race/Ethnicity

We found that African-Americans were significantly more likely
than whites to become a principal. The main effect was large, and the
joint effect of all variables that contained the African-American
indicator was significant. Overall, the probability of becoming a
principal was 0.19 percent for African-Americans and 0.086 percent for
whites, indicating that African-American educators are 2.2 times more
likely to become a principal in North Carolina. As mentioned above,
being female increased the chances that an African-American educator
would become a principal.

We found that African-American educators in urban and suburban
schools were less likely to drop out than those in rural schools and

that an increased percentage of minority students in a school increased the likelihood that an African-American educator would remain in the system. Experience levels were also related to the probability of an African-American dropping out: The interaction of the African-American indicator with experience was negative until approximately 12 years of experience, at which point it became positive.

Quality of Undergraduate Institution Attended

The quality of an educator's undergraduate institution was unrelated to the probability of becoming a principal in both models. Compared to the reference group, those who had gone to highly competitive colleges had a higher probability of dropping out of the system, and those who had gone to noncompetitive colleges had a lower probability of dropping out.

School Characteristics

Educators working in a large school were more likely to drop out of the system.

Compared to teachers working in an elementary school, those who worked in a middle school had a lower probability of becoming a principal if they were male, but a higher probability of dropping out of the system whether they were male or female. Educators working in a high school had a lower probability of becoming a principal and a higher probability of dropping out, particularly if they were women. Being in a combined school also decreased the probability of becoming a principal. The probabilities of becoming a principal for those working in elementary, middle, high, or combined schools were 0.11, 0.10, 0.09, and 0.06 percent, respectively.

Urbanicity did not affect the likelihood of becoming a principal or dropping out except in the interactions with female and African-American discussed above. The wealthier the county in which the school was located, the less likely an educator was to drop out of the system. In addition, the higher the percentage of minority students in the school, the more likely an educator was to drop out of the system.

TWO-STAGE ANALYSIS: TRANSITION TO ASSISTANT PRINCIPALSHIP, AND TRANSITION FROM ASSISTANT PRINCIPALSHIP TO PRINCIPALSHIP

The purpose of this analysis was to identify individual- and school-level factors associated with the probability of becoming a principal. This analysis differed from the one described above in that we modeled the transition to the principalship as a two-step process: first becoming an assistant principal, and then becoming a principal. To do this, we used two discrete time competing risk models that were implemented by estimating multinomial logit models. The first model, which is for the transition to the assistant principalship, has four possible outcomes: leave the system, remain in the system but do not become an assistant principal or principal, become an assistant principal, and become a principal (directly from teaching). The sample for this model included all people who began as teachers in the North Carolina public school system, were not currently in a principal or superintendent position, and worked in the system between school years 1987–1988 and 1999–2000. In the second stage of the analysis, we created a subsample of assistant principals and estimated a multinomial logit model with three possible outcomes: leave the public school system, remain in the system but not as a principal, and become a principal. (See Table B.3 for summary statistics for the dependent and independent variables, and see Table B.4 for the results of the model estimation.)

The data for each stage of the model were structured so that there was one observation per person per year for each year the person was in the data and had not made one of the transitions of interest. In other words, once a person made a transition, he or she was dropped from the analysis sample.

Note that all specifications cluster on school.

Transition to Assistant Principalship

Although the first model included becoming a principal as one of the potential outcomes, our discussion here focuses on our results for the assistant principal transition, because this is the aspect of this model that makes it different from the standard three-outcome model we described previously. Moreover, the predictors of leaving the system

and of becoming a principal in this four-outcome model were quite similar to those found for the previous model.

We found that the overall probability of an average teacher in the North Carolina public system becoming an assistant principal in a given year was very small, about 0.2 percent. The probability did vary, however, by teacher characteristics, including gender and race/ethnicity.

Gender. In both models, females were less likely than males to become assistant principals relative to staying in teaching or in the system in some other capacity.

We found a significant negative main effect for females, and the coefficient on this variable was larger than any positive coefficient or combination of positive coefficients on the female interaction terms, which indicates that females were overall less likely than males to become a principal. In addition, the joint effect of all variables that included the female indicator was significant. When we assigned average values to all variables except the female variable and allowed the female variable to be switched on, we found that females had a 0.18 percent probability of becoming assistant principals, whereas the same exercise with the female variable switched off produced a probability of becoming a principal of 0.61 percent for males. All else equal, this suggests that men in North Carolina are over three times more likely than women to become principals.

The gender and school-level interactions suggest that female teachers in both high schools and middle schools are more likely than female teachers in elementary schools to become assistant principals or principals, but are less likely than males in any type of school to become assistant principals. The gender-urbanicity interaction suggests that females in urban areas are more likely than females in rural areas to become assistant principals. Moreover, African-American female teachers are significantly more likely than white female teachers to become assistant principals.

Race/Ethnicity. In this model, African-Americans were more likely than the reference group to become assistant principals relative to staying in the system as teachers or in some lower-level administrative

capacity. This coefficient, however, was only significant at the 10 percent confidence level.

Quality of Undergraduate Institution Attended. The competitiveness of the undergraduate institution attended by teachers did not have a statistically significant effect on the probability of becoming an assistant principal.

School Characteristics. Teachers working in a large school were found to be no more likely than teachers working in smaller schools to become an assistant principal, once we controlled for school level and urbanicity. Educators who worked in a middle school, as opposed to an elementary school, had a lower probability of becoming an assistant principal, although this coefficient was only significant at the 10 percent confidence level. Being in a high school significantly decreased the probability of becoming an assistant principal. Except for the case of high school educators, who were found to be less likely to drop out of the system, it appears that educators in elementary schools have the greatest probability of remaining in the system and becoming higher-level administrators.

Educators in urban schools were no more likely than educators in rural schools to become assistant principals.

Transition from Assistant Principalship to Principalship

In the second stage of the analysis, we limited the sample to people who were assistant principals and modeled the probability that they leave the system, remain in the system but not as a principal, or become a principal. The overall probability of an assistant principal becoming a principal in North Carolina in any given year was about 8 percent and was roughly the same for males and females. The fact that this probability is fairly low suggests that the assistant principalship is for many individuals an end in and of itself, rather than a stepping-stone into the principalship.

Gender. In both models, we found that, once having become an assistant principal, women were no more likely than men to become a principal relative to staying in the system as an assistant principal or in some other capacity.

Race/Ethnicity. We found that African-American assistant principals were neither more nor less likely than assistant principals in the reference category to become principals. African-American assistant principals were also no more likely to drop out of the system overall compared to the reference group. But African-American assistant principals in urban schools were less likely to drop out of the system relative to black assistant principals in rural areas and relative to white assistant principals in general.

Quality of Undergraduate Institution Attended. Once an individual has become an assistant principal, the competitiveness of the undergraduate institution attended does not relate to transition probabilities. Assistant principals from highly competitive and noncompetitive institutions were neither more nor less likely than those from other types of institutions to become principals.

School Characteristics. Assistant principals in middle schools were found to be less likely than assistant principals in elementary schools to become principals. In addition, assistant principals in both urban and suburban schools were no more or less likely than their counterparts in rural schools to become principals.

The wealth of the county slightly increased the probability of an assistant principal entering the principalship.

TRANSITION TO SUPERINTENDENCY

The goal of this analysis was to identify individual- and school-level factors that affect the probability of a person's making the transition to the superintendency and/or leaving the North Carolina public school system. We used a discrete time competing risk model that was implemented by estimating a multinomial logit model with three possible outcomes: leave the system, remain in the system but do not become a superintendent, and become a superintendent. The sample includes all people who began in the North Carolina public school system, were not currently in a superintendent position, and worked in the system between school years 1987—1988 and 1999—2000. The data were structured so that there was one observation per person per year for each year the person was in the data and had not made one of the transitions of interest (i.e., had not become a superintendent or left

the system). In other words, once a person made a transition, he or she was dropped from the analysis sample.

It should be noted that in the data set used for the multinomial models (i.e., restricted to the years 1988–2000), almost three-quarters of superintendents in North Carolina did not begin their careers in the North Carolina public school system. This implies that the majority of superintendents came either from other states or from occupations outside of the public school system, which means they would not be considered in this analysis.

Overall, we found that the probability of becoming a superintendent for individuals who began their careers in the North Carolina public school system was practically null (0.0006 percent). However, individuals from highly competitive undergraduate institutions were found to be twice as likely as those from somewhat competitive or noncompetitive schools to become superintendents.

Gender. Our results suggest that females are no more likely than males to become superintendents. We did find, however, that females in wealthier counties were less likely than males to become superintendents. This coefficient was only significant at the 10 percent confidence level.

Race/Ethnicity. African-Americans in the North Carolina public schools were no more likely than whites to become superintendents relative to remaining in the system as teachers, as administrators, or in some other capacity.

Quality of Undergraduate Institution Attended. Having graduated from a highly competitive school increased the probability of becoming a superintendent. This effect appears to be very robust.

District Characteristics. The only district characteristics that entered the model were urbanicity, district student membership (i.e., total district enrollment), and county wealth rank.

Only district membership seemed to be related to the probability of becoming a superintendent. Individuals in larger districts were less likely than those in smaller districts to become superintendents. This may suggest that it is harder to become a superintendent in a large district, possibly because the job involves a wider set of responsibilities or is mostly given to people that do not rise up the

ranks. In fact, the positive correlation between district membership and what the individual began as was highest for individuals who began as superintendents in the North Carolina school system.

We should emphasize that these results apply only to the close to 25 percent of individuals who became superintendents in the North Carolina public school system by rising through the ranks of the system. Most of these, in fact, began their careers as either teachers or lower-level administrators. Because the vast majority of superintendents in North Carolina come from outside the system, the factors that predict whether *any* individual, as opposed to individuals who began their careers in the North Carolina public school system, becomes a superintendent might be very different from the ones we discuss here.

MODEL OF PRINCIPAL MOBILITY AND ATTRITION

In this analysis we wanted to identify individual- and school-level characteristics that affect the probability of a person's leaving the principalship for another job within the state's public school system, remaining a principal but changing schools within the system, and leaving the system. To do this, we used a discrete time competing risks model that was implemented by estimating a multinomial logit model with four possible outcomes: leave the system, remain a principal in the same school, remain a principal but change schools, and remain in the system but not as a principal (for simplicity, we refer to this as "changing positions"). The analysis sample included all people who were in a principal position and had worked in the system between school years 1987–1988 and 1999–2000. The data were structured so that there was one observation per person per year for each year the person was in the data as a principal.

According to our results, the overall probabilities that a principal leaves the school system, stays as a principal in the same school, becomes a principal in a different school, or transitions to a nonprincipal position are 2.4, 82.3, 9.4, and 5.8 percent, respectively. These probabilities varied for different demographic groups.

Gender. We did not find any significant coefficients on the main female indicator for any of the possible outcomes, but the joint effect of all the female-related variables in the model was significant. Overall, the probability of a principal leaving the system was 1.7 percent for females and 2.9 percent for males, the probability of staying a principal but switching schools was 9.6 percent for females and 9.4 percent for males, and the probability of transitioning to a nonprincipal position was 6.3 percent for females and 5.7 percent for males. The probability of remaining a principal in the same school in a given year was 82.5 percent for females and 81.9 percent for males.

With regard to interaction effects, we found that, compared to female principals in elementary schools, female principals in middle and combined schools had increased chances of leaving the system, and those in combined schools had increased chances of switching schools.

Race/Ethnicity. We found no significant main effects for the African-American indicator, nor were the variables that involved the African-American indicator jointly significant. We did find, however, that African-American principals in urban schools had a decreased chance of transitioning to a nonprincipal position.

 Quality of Undergraduate Institution Attended. There was no evidence of a main effect for having graduated from either a highly competitive or a noncompetitive school in any of these transitions.

School Characteristics. School characteristics appear to have played a somewhat greater role than individual characteristics did in affecting the probabilities of making these transitions. Results from our model indicate that principals of larger schools are less likely to change schools than to remain as principals in their current schools.

We found that, compared with principals in elementary schools, high school principals had a higher probability of transitioning to a nonprincipal position, and middle school principals had a higher probability of changing schools and of transitioning to a nonprincipal position. Principals of combined schools had a lower probability of leaving the system if they were male.

As for urban versus rural versus suburban schools, we found that principals in urban schools were more likely than those in rural schools to leave the system and to change schools, but were less likely

than principals in rural schools to transition to a nonprincipal position. Principals in suburban schools were found to be less likely than principals in rural schools to transition to a nonprincipal position.

We found that the wealthier the county in which the school was located, the less likely the principal was to leave the system or transition to a nonprincipal position. We also found that the higher the percentage of minority students in the school, the more likely the principal was to change schools or to transition to a nonprincipal position rather than remain as principal in the same school.

5. DISCUSSION AND CONCLUSIONS

Taken together, the descriptive analysis and multinomial logit models of administrative careers raise some interesting issues about what administrative data can and cannot say about the careers of school administrators. Those issues are discussed here, along with conclusions we reached based on our analyses.

DESCRIPTIVE OVERVIEW SUGGESTS SUBSTANTIAL GROWTH AND DEMOGRAPHIC SHIFTS IN THE POPULATION OF NORTH CAROLINA SCHOOL ADMINISTRATORS

The findings of our descriptive overview of North Carolina administrators echo those of the national overview of school principals' careers in Gates, Ringel, and Santibañez, 2003, as well as those of analyses of the careers of school administrators in New York (Lankford, O'Connell, and Wyckoff, 2003) and Illinois (Ringel, Gates, and Ghosh-Dastidar, 2004). The average age of all teachers and school administrators in North Carolina increased over the last decade. Similarly, the age distribution of all principals and first-time principals shifted to the right and narrowed, suggesting that individuals are entering the principalship at older ages but that retirement behaviors have not changed.

The proportion of female school administrators in North Carolina is still lower than the proportion of female teachers, but female representation among school administrators increased consistently over time and across all administrative positions (assistant principals, principals, other administrators, and superintendents). This is consistent with the findings for New York and Illinois. In the 1999–2000 school year, 81 percent of North Carolina teachers were female, compared with 48 percent of all principals, 60 percent of first-time principals, 57 percent of assistant principals, 65 percent of other administrators, and 30 percent of superintendents. Ten years earlier, in the 1989–1990 school year, only 20 percent of superintendents and 26 percent of principals were female.

Different patterns are evident with respect to minority administrators. In the 1999–2000 school year, African-Americans made up approximately 31 percent of the entire student population of North

Carolina,[1] but minorities made up only 16 percent of the teaching force, 24 percent of all principals, and about 18 percent of all superintendents.[2]

The proportion of administrators who are members of minority groups increased modestly over time for each category of administrator. Similar trends were observed in Illinois.

Our analysis of the subsequent career choices made by first-time principals in North Carolina public schools suggests they are experiencing substantially more mobility than first-time principals in Illinois are. We found that, after six years, just under half (48 percent) of first-time principals in North Carolina were still principals in the public school system, and that fewer than half of these individuals (38 percent) had remained in the same school. Fourteen percent of North Carolina's first-time principals returned to teaching within six years—a substantially higher percentage than was the case in Illinois. And 26 percent of North Carolina's first-time principals left the system entirely within six years.

The descriptive information presented here is generally supportive of the national findings of Gates, Ringel, and Santibañez (2003). There is one sense in which these data suggest potentially different conclusions, however (as is reflected in Chapter 2's Figure 2.1). Based on their examination of data on the number of school principals, Gates, Ringel, and Santibañez concluded that growth in the number of school administrators has been relative modest. The North Carolina data revealed something else, however: While the number of school principals and superintendents increased only modestly or even decreased, the total number of school administrators indeed increased over time, due to substantial increases in the number of other administrators and assistant principals. Similar trends were observed in Illinois. This suggests that schools and districts are increasingly assigning

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[1] http://www.ncpta.org/Bulletin/April00/april00ward.html.

[2] In Illinois, 24 percent of students enrolled in education programs (other than educational administration) and 29 percent of students enrolled in educational administration programs were minority in 1999—2000. (Illinois Board of Higher Education, n/d). No such data were available for North Carolina.

administrative duties and positions to individuals other than principals and superintendents, and it argues for a better understanding of the roles these other individuals are playing in the school and district context.

ANALYSIS OF FACTORS RELATED TO THE TRANSITION TO ADMINISTRATION PROVIDES ADDITIONAL INSIGHTS ON CAREER PATHS

Our multivariate analysis of the characteristics related to the transition to school administration supports a deeper understanding of some of the high-level descriptive trends—providing further support for trends suggested by the descriptive overview in some cases, and providing qualifications in others.

Although Demand for School Administrators Has Grown, There Is No Evidence of a Supply Crisis

As mentioned above, there has been modest growth in the number of administrative positions (which translates into demand for school administrators) in North Carolina public education. However, there is no evidence that this demand has run up against a limited supply. One possible indication of a supply crisis would be a sudden increase in the probability that an individual moves into administration, which would suggest that the school system is tapping into the pool of potential administrators more aggressively than it had in the past.

Our analyses reveal no time trend in terms of the probability that individuals in the North Carolina public school system transition to the principalship. In the 1999–2000 school year, teachers represented approximately 93 percent of the professional staff in North Carolina public schools and districts; other administrators, principals, and assistant principals represented approximately 2 percent each; and superintendents represented under one-half of 1 percent of the total. Clearly, schools and districts neither want nor need a large proportion of teachers to transition to administrative positions. When we used our estimates from the two-stage model of transition to the assistant principalship or principalship to calculate average probabilities, we found that an educator has a 5 percent chance of leaving the school system in a given year, a 0.23 percent chance of becoming an assistant principal, and a 0.008 percent chance of becoming a principal directly.

Assistant principals have an 8 percent chance of becoming principals in a given year, and a 2 percent chance of leaving the system.

The Gender Gap Is Alive and Well

Public sector organizations often place value on the racial/ethnic and gender composition of those they employ. Specifically, governments often strive to ensure that the composition of their workforce reflects the composition of the workforce as a whole, and that the composition of management reflects that of their workforce as a whole. Our analysis raises some important concerns for policymakers on both scores.

Despite the encouraging trends we found in terms of gender representation in our analysis of North Carolina's public school system, we also found that across the board, females are less likely than males to advance to administrative positions. When we controlled for other characteristics, we found that men were four times more likely than women to become principals directly, and over three times more likely than women to become assistant principals over the 1987–2000 period. And we found no evidence that the rate of transition grew more favorable for women over that period. However, we did find that once women become an assistant principal, there is little difference between them and men in terms of the probability of becoming a principal. These findings were similar to those for Illinois, where men were over 2.5 times more likely than women to become assistant principals, but female assistant principals were 20 percent more likely to become principals. Lankford, O'Connell, and Wyckoff (2004) found that in New York, men were 30 percent more likely to become certified for administrative positions, but that certified women were neither more nor less likely than certified men to become principals. These findings suggest that the gender gap may be strongest at the point when individuals make the initial transition to administration.

Our results also suggest that the gender gap is not a characteristic specific to high schools. We found that in North Carolina in 1999–2000, women represented well over half of the principals in elementary schools, but only 24 percent of high school principals and 41 percent of middle school principals. Several studies have pointed to such differences as evidence that women in high schools

face special challenges (U.S. Department of Education, 1994; Riehl and Byrd, 1997). However, our analysis revealed that relative to women in elementary schools, women in middle and high schools are actually more likely to become principals or assistant principals. In other words, gender differences in the teaching pool at the elementary and high school levels are driving the differences in representation in school administration. We found that women made up 94 percent of elementary school teachers, compared with 63 percent of high school teachers.

As we mentioned earlier, the analysis of career transitions allowed us to identify characteristics of an individual that relate to the probability of that individual becoming an administrator. The event of becoming an administrator is a result of two forces, or decisions: an individual must decide he or she wants to become an administrator, and a school must decide to hire that individual as an administrator. Our findings are similar to those for other professions. For example, an analysis of gender differences in the promotion to partnership among lawyers in large firms (Spurr and Sueyoshi, 1994) found that women are much less likely to be promoted to partner and somewhat more likely to leave the firm without being promoted than men are, and that the gender gap did not change much over time between the 1970s and 1980s. Our finding that women are less likely to become administrators could stem from women being less likely than men to seek out administrative positions, or from schools and districts being less likely to hire women who are interested in such positions, or a combination of the two. In other words, gender differences in career preferences and gender discrimination are both plausible explanations for the finding, and we have no evidence to favor one explanation over the other. We cannot conclude that women suffer discrimination in terms of promotion to administrative positions.

The Administrative Pipeline May Not Be Well Primed to Increase the Proportion of Minority Principals

In contrast to our findings for gender representation among North Carolina administrators, we found that minorities are underrepresented in the teaching pool relative to the overall population, but that minority administrators are well represented relative to the teaching

pool. Overall, our analyses suggest that African-American teachers are slightly more likely than white teachers to leave the North Carolina public school system. In other words, teacher retention is lower for minority teachers. African-Americans are also over twice as likely to become principals.

This supports the trends we see in the descriptive data and raises concerns about the administrative pipeline. At a time when the proportion of students who are minority is increasing, the pool from which minority administrators are drawn may be declining. To the extent that schools and districts seek more minority candidates for administrative positions, attention must be paid to the teaching pool and to the retention of minority educators in the public school system more generally.

North Carolina Public Schools Are Less Likely to Retain But More Likely to Promote Educators Who Graduate from Highly Competitive Colleges

As we mentioned earlier, our analysis suffered from a lack of information on the quality of school administrators. One measure we do have is the ranking of the undergraduate institution an individual has attended.

We found that individuals who attended a highly competitive college were much more likely to leave the North Carolina public education system, whereas those who attended a noncompetitive school were less likely to do so. This suggests that the school system is more likely to retain those with more-limited outside opportunities. We also found that individuals who attend highly competitive colleges are more likely to become superintendents. These findings argue for better data on administrator performance so that career paths may be understood in the context of a school's or district's ability to recruit and retain effective administrators.

Principal Turnover in North Carolina Is Relatively High

The descriptive analysis revealed a substantial degree of mobility among North Carolina school principals. The multivariate analysis confirmed this finding and suggests that school characteristics influence the levels of administrative stability. Over the 1987—2001 time frame, turnover among school principals in North Carolina, viewed

from the perspective of an individual school, was 18 percent per year. In contrast, principal turnover in Illinois was found to be lower, at 14 percent (Ringel, Gates, and Ghosh-Dastidar, 2004). However, we found that only 2.4 percent of the turnover in North Carolina was due to principals leaving the system. Specifically, among the pool of principals in a given year, we found that in the next year, 82.3 percent were still principals in the same school, 9.4 percent had become principals in a different school, 5.8 percent remained in the North Carolina school system but not as principals (for example, they might have returned to teaching or have taken another administrative position), and only 2.4 percent had left the system.

With regard to the issue of race/ethnicity as it relates to principal turnover, we found that principals in schools with a larger proportion of minority students were more likely to change schools and to leave the principalship but remain in the system. This suggests that schools serving higher proportions of minority students may have a harder time retaining principals than those with lower proportions of these students do. However, we also found that a principal who is the same race/ethnicity as the largest racial/ethnic group in the school is less likely than other principals to switch schools or to leave the principalship to take another position in the school system. This suggests that high-minority schools might improve their leadership stability by hiring principals of the same race/ethnicity as that of the largest racial/ethnic group in the school, although the demographic trends discussed earlier imply that this may be a difficult strategy to implement.

We also found that, controlling for school size, principals at middle and high schools were more likely than principals at elementary schools to change schools. This suggests that there is more leadership stability at the elementary school level, and is consistent with findings from the national overview (Gates, Ringel, and Santibañez, 2003).

Another finding is that the wealthier the county in which the school is located, the less likely the principal was to transition to a nonprincipal position. In North Carolina, the wealthier counties

typically add the highest local supplements to principals' state pay scale.

Of course, we must emphasize that turnover is not always bad, and that workforce turnover is a natural part of employment management. Employers need the flexibility to fire or otherwise rid themselves of employees who do not work out for one reason or another. Relative to the level of employee turnover in the private sector and even in federal government organizations, the level of employee turnover we observed in the North Carolina public school system was quite low. A study by Burgess, Lane, and Stevens (2001) found that more than 75 percent of employers have turnover, or churning, rates[3] above 10 percent. The mean churning rate is 25 percent, and churning rate increases in a stronger labor market. Turnover may reflect an employee deciding to leave an organization, or an organization deciding that the employee should leave, or both. The belief that administrative turnover is bad for public schools reflects an implicit assumption that all sitting principals are good at what they do and that schools therefore suffer when there is principal turnover. However, it may be the case that schools with higher turnover are simply better at getting rid of principals who do not work out. A recent report by Public Agenda (2003) suggests that turnover among principals may actually be inefficiently low, but that the school accountability movement may be changing that. Until we have reliable measures of principal quality, it is impossible to conclude whether schools that experience higher administrative turnover are really at a disadvantage relative to those that have lower turnover.

LACK OF DATA ON THE QUALITY OF ADMINISTRATORS IS A SERIOUS LIMITATION OF ADMINISTRATIVE DATA

Once again, we must point out that the state administrative data are seriously limited in that they lack valid measures of the quality of school administrators. This is not a criticism of the data per se,

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[3] Churning is defined as the amount of worker turnover beyond that required for the firm to achieve its desired employment growth. For a firm that is neither growing nor declining, any amount of churning would be characterized as turnover.

however. These data are used primarily to ensure compliance with state certification rules, to satisfy state reporting requirements, to manage a salary schedule, and to track eligibility for retirement benefits, so they include primarily demographic, certification, and assignment information. In other words, there is no reason to expect that they would shed light on the quality of school administrators.

The analyses we performed show how research efforts can exploit the information that is collected in order to glean insights relevant to policy goals. Our research suggests that state administrative data provide a rich source of information for detailed analyses of career paths. To the extent that policymakers strive to achieve demographic goals--such as increasing the representation of women and members of racial/ethnic groups among school administrators--these data can help in different ways: in monitoring progress toward those goals, in understanding barriers to achievement, and possibly in suggesting useful targets of opportunity for their achievement. But the data do not allow policymakers to address the issues of whether good administrators are being promoted and retained and whether turnover is indeed a bad thing.

ADMINISTRATIVE DATA PROVIDE A MODEL FOR DATA COLLECTION EFFORTS THAT COULD PROMOTE A RICH UNDERSTANDING OF THE CHARACTERISTICS AND CAREER PATHS ASSOCIATED WITH ADMINISTRATORS WHO HELP IMPROVE STUDENT LEARNING

With the current state and federal emphasis on accountability, schools, districts, and even states are beginning to track much more information related to student performance, school performance, and administrators' skills, attributes, and abilities. The collection of test score data over time at the school level, and even at the classroom level, is becoming quite common. Hamilton (2002) has argued that statewide data on student test scores that link students from year to year and to individual schools and classrooms should be collected. Many large districts are capable of tracking individual students and linking student scores to schools and classrooms. Moreover, many districts are implementing standard evaluation tools for school administrators districtwide, and states have considered imposing the Educational Testing Service (ETS) school leadership assessment as a component of or an alternative to state certification requirements.

The administrative personnel data could be used in conjunction with both systematically collected data on student and school outcomes and attributes of educators and administrators to better understand the characteristics of individual educators and administrators and their careers that contribute to success and to help schools and districts manage according to those characteristics. When we use the term *characteristics* here, we mean more than the basic demographic information currently contained in administrative data sets. In theory, states or districts could begin to systematically collect more-subtle information on individuals--characteristics that one might believe are related to improved learning outcomes for students. Imagine an analysis such as the one we conducted, but with an empirically valid performance measure for principals as an independent variable. Rather than the focus being on differences between men and women, it could be on differences between successful and unsuccessful principals. Or one could examine whether certain types of schools are more or less likely to lose good principals. The possibilities are almost endless.

Identifying data that reflect the performance of school administrators is no small feat, however; and the first challenge is to develop evidence on the importance of school leadership. This challenge of providing evidence on the importance of leadership is not specific to public schools. In a summary of public sector leadership theory, Van Wart (2003) has concluded that most of the research in this area emphasizes normative debates regarding the proper role of administrators, rather than empirical work directed at understanding the importance of public administrators:

> [M]ost public administration scholars and almost all
> practitioners simply assume or assert the importance of
> public administrators. Unfortunately, there is a tendency to
> treat all situations in which leadership is important as a
> single monolith, rather than exploring the ramifications of
> different types of leadership in different contexts with
> varying missions, organizational structures, accountability
> mechanisms, environmental constraints, and so on. This means
> that the technology of leadership is much less articulated on
> the public-sector side than the private-sector side. (p. 223)

Van Wart has also emphasized the need for a comprehensive leadership model that integrates the transactional and transformational

leadership perspectives, and for empirical research that entails testing the leadership theories in different settings.

This assessment and call to action can be related to the literature on leadership and administration in public schools. In simplest terms, the field needs to develop systematic information on the characteristics of school administrators that matter for student learning in particular contexts. To achieve this aim, two tasks must be accomplished: Identify those characteristics that matter for student learning in particular contexts, and gather systematic information on those characteristics to the greatest extent possible.

Identifying Characteristics of School Administrators That Matter for Student Learning

The literature on private sector organizational leadership has long recognized the link between effective leadership styles, skills, and behaviors and the needs of organizations (see, for example, Schaeffer, 2002; Van Wart, 2003). Similarly, in schools and districts, those leadership characteristics that matter most for student learning are likely to vary by context.

Some progress has been made in the literature in terms of thinking about what these characteristics, skills, and behaviors are. Policymakers can look to existing leadership standards as a useful starting point for developing a list of candidate characteristics that matter. For example, the Interstate School Leaders Licensure Consortium Standards for School Leaders (better known as the ISLLC Standards) has developed a list describing the kinds of knowledge, dispositions, and performance records that school leaders should possess or exhibit. According to the ISLLC Standards (Council of Chief State School Officers, 1996, pp. 10 and 11), a school administrator should, for instance, have knowledge of "effective consensus-building and negotiation skills"; be committed to the "inclusion of all members of the school community"; and act to ensure that "the school community is involved in school improvement efforts." These standards were developed based on expert opinion, experience, and theory; in the future, systematic evidence may confirm that some or most of these characteristics lead to improved student learning.

Also useful for identifying characteristics are empirical studies
of the leadership characteristics that appear to have influenced
student learning in specific contexts (See Waters, Marzano, and
McNulty, 2003, for a summary of such empirical studies). However, we
caution policymakers that a focus on the characteristics that are part
of existing licensing standards or that others have studied might lead
one to ignore potentially important characteristics. It may be wise to
consider more-generic leadership characteristics, such as those
identified by the Center for Creative Leadership or the Gallup
Organization.[4]

The efforts just described adopt a perspective that there is a
single set of characteristics for all good school administrators.
Portin (2003) has identified key leadership functions that must be
performed within a school,[5] but Portin has also noted that different
functions may be more or less important depending on the school
context. At the other extreme, the effective schools literature (Purkey
and Smith, 1983; Teske and Schneider, 1999; Bryk, Lee, and Smith, 1989)
has placed the characteristics and activities of school administrators
that have led to improved student learning in specific contexts. This
literature has been able to draw out some broad generalizations--for
example, that effective schools have a clear vision, that effective
principals establish clear and consistent rules, and that the specific
vision and rules usually depend on context.

**Systematic Data on the Characteristics That (Might) Matter for Student
Learning Can Help Validate Theory and Assist Policymakers**

At this point, there are plenty of theories or assertions about
the characteristics of school leadership that matter for student
learning. Less progress has been made, however, in developing tools to
measure the characteristics and in developing systematic sources of
information on those characteristics. Ultimately, such information is

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[4] http://www.ccl.org/CCLCommerce/assessments/overview.aspx?
CatalogID=Assessments&CategoryID=Overview(Overview); (http://www.
gallup.com/content/default.asp?ci=1435.

[5] Portin does not demonstrate that the successful performance of
these functions led to improved student learning.

needed to validate the theories about important school leadership characteristics.

By systematic data, we mean data collected on every individual that falls within a certain unit of analysis. The unit of analysis could be the state, or the district--the broader the unit of analysis is, the more useful the data will be for identifying important characteristics and making use of that information. For example, in states where principals are required to undergo ETS school leadership assessments, their scores could be retained as part of the state data system. Similarly, states or districts that use a common evaluation tool for school principals could record the scores in the state data system.

With the recent No Child Left Behind legislation, and the more general, state-level emphasis on accountability, data that link individual teachers and administrators with individual students (and their test scores) are increasingly available. It may be possible to develop value-added measures for administrators using school-level test score data, and for teachers using classroom-level test score data. However, the validity of such measures would hinge on the ability to link individual students to schools and classrooms and to track student performance year by year. Existing data available through the American Institutes for Research (AIR) on average test scores for one or two grade levels within a school are inadequate for measuring the effectiveness of a principal, much less teachers. Similarly, the use of teacher turnover as a measure of principal effectiveness, with high teacher turnover reflecting poor principal leadership skills, is problematic in that it defines high teacher turnover as a negative. After all, high teacher turnover can just as readily be interpreted as a positive if one assumes that an effective principal is one that encourages poorly performing teachers to leave. Here again, unless we have a measure of teacher effectiveness, it is impossible to conclude that teacher turnover is a problem. Additional information--such as performance evaluations using systematic evaluation tools, or systematic surveys of teachers about their principal's effectiveness-- could be married with administrative data to provide insights on the career paths of successful administrators.

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APPENDIX A: ADDITIONAL DESCRIPTIVE ANALYSIS FIGURES AND TABLES

In this appendix, we present additional figures and tables that, together with the figures in Chapter 2, provide a detailed descriptive overview of North Carolina school administrators and their careers. This information is the basis for many of the findings discussed in Chapter 2.
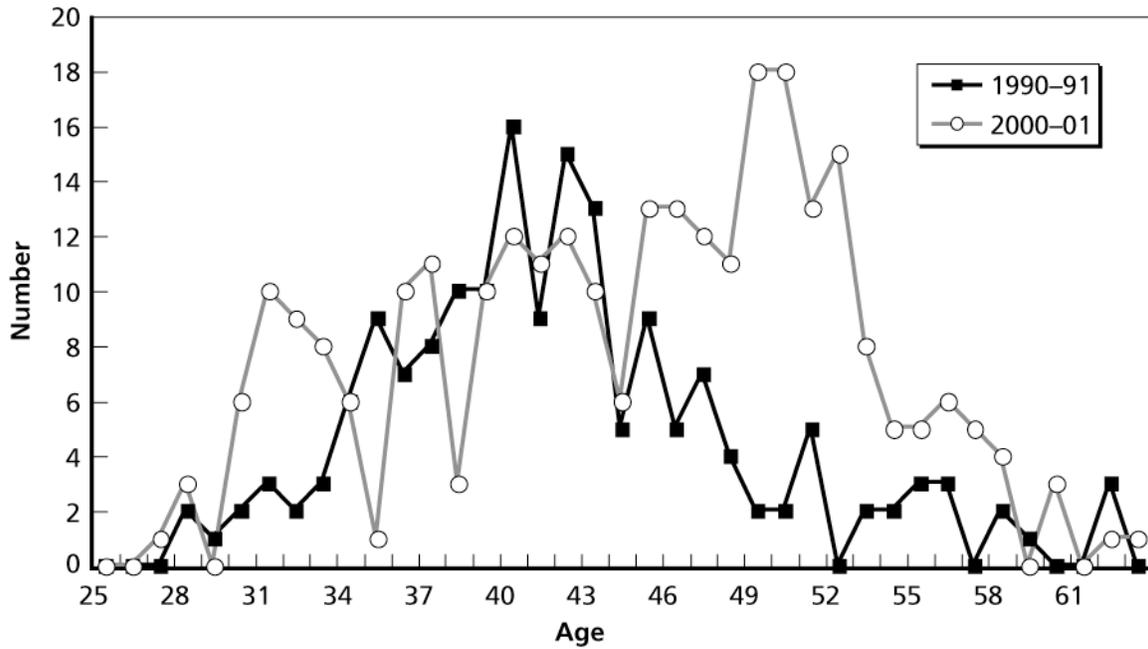
RAND TR129-A.1

Figure A.1: Age Distribution of All Principals in North Carolina, 1990 and 2000
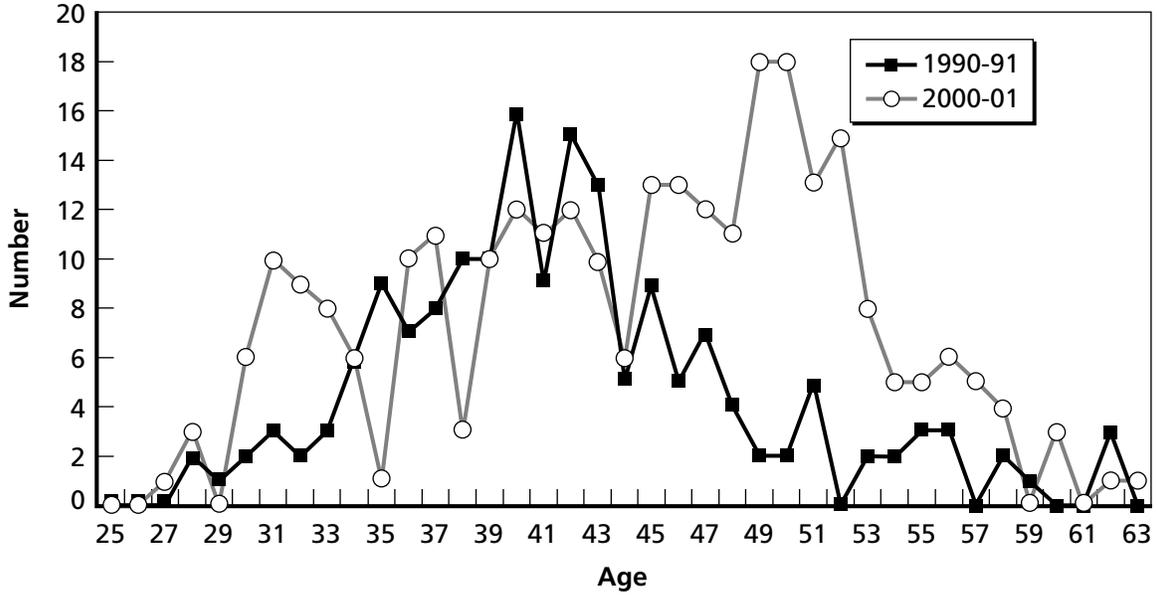
RAND *TR129-A.2*

Figure A.2: Age Distribution of First–Time Principals in North Carolina, 1990 and 2000
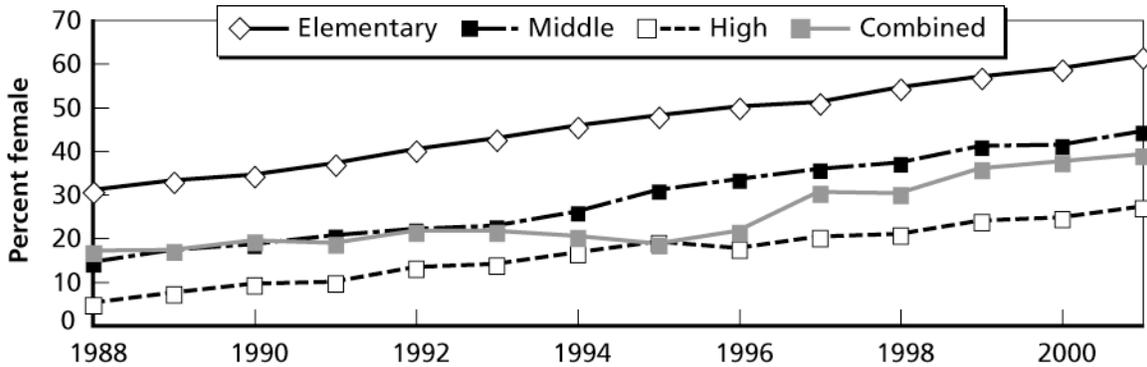
RAND *TR129-A.3*

Figure A.3: Proportion of North Carolina Principals That Are Female, by Grade Level
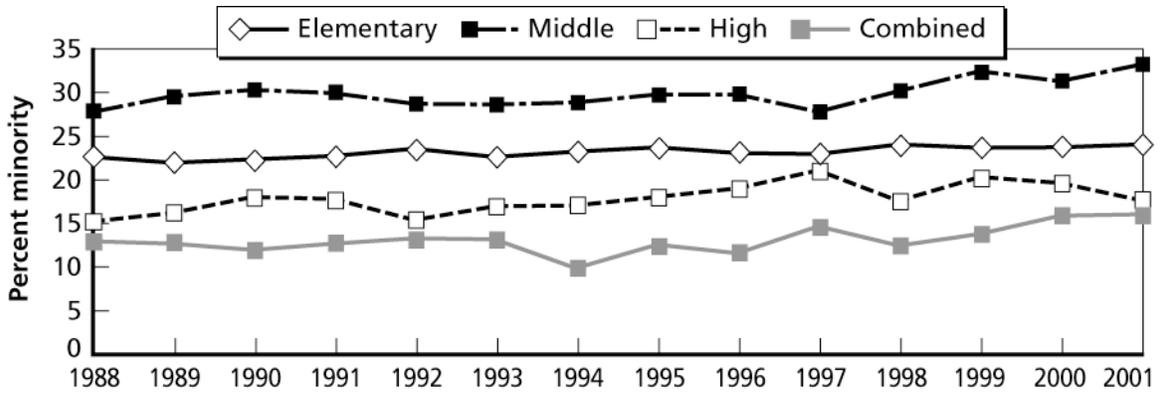
Figure A.4: Proportion of North Carolina Principals That Are Minority, by Grade Level
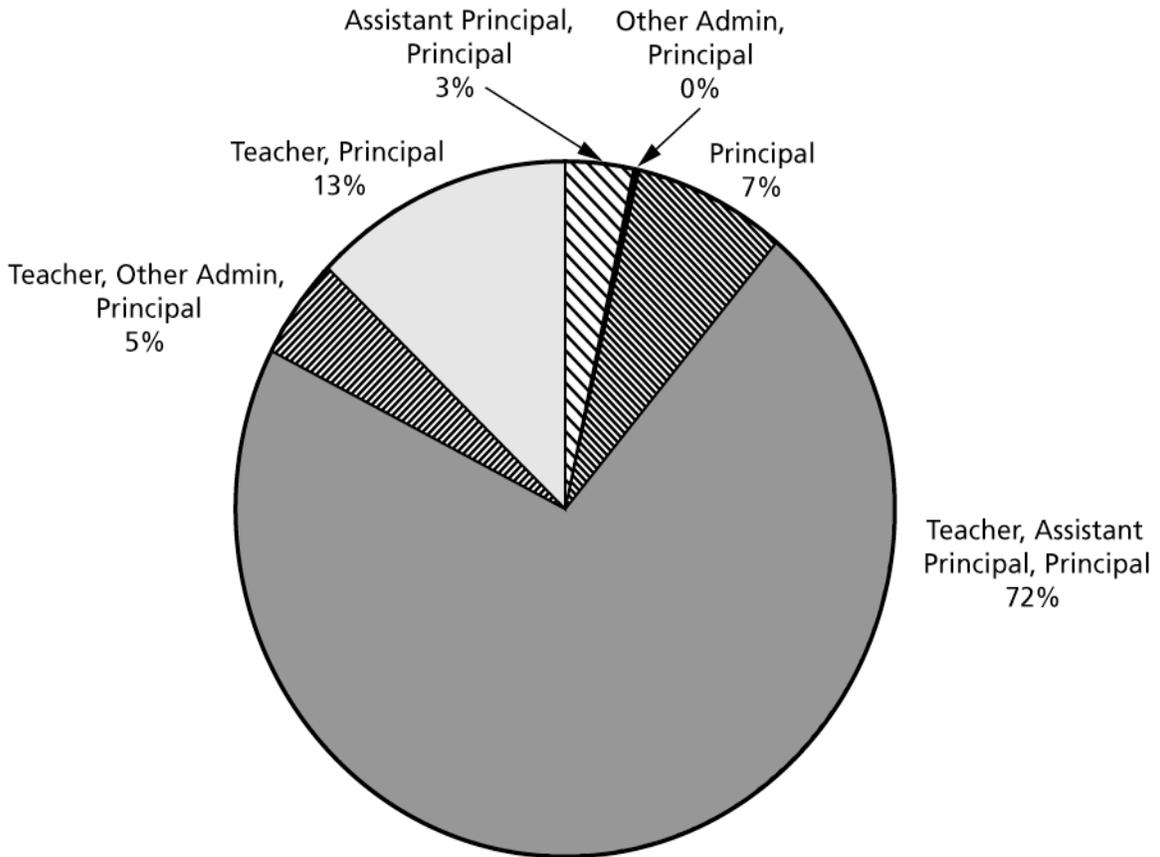
Figure A.5: Career Paths Followed by First-Year Principals in North Carolina, 1987—1999 Cohorts
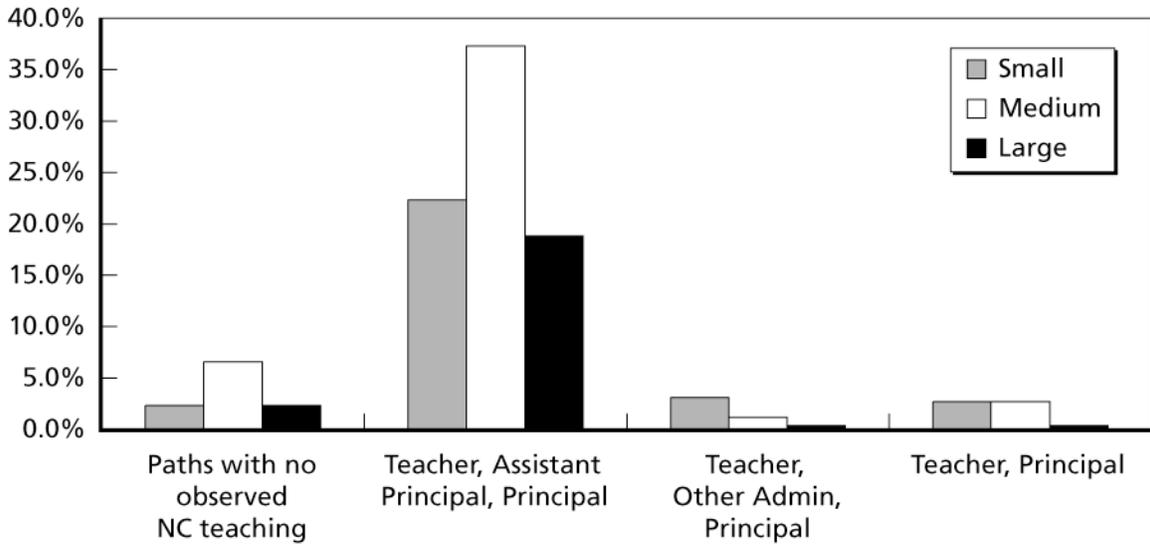
RAND *TR129-A.6*

Figure A.6: Career Paths Followed by First-Year Principals in North Carolina, 1987–1999 Cohorts, by School Size

Table A.1

Characteristics of All Principals in North Carolina, 1990, 1995, 2000

	1990	**1995**	**2000**
Age at beginning of school year	46.1	47	48.3
Age at first principalship	35.5	32	30.2
Percent over 50	26.2%	27.6%	38.2%
Percent over 55	11%	8.1%	12.3%
Years of experience as principal	7.5	7.9	7.4
Percent with master's degree	98.4%	99.3%	99.7%
Percent with Ph.D.	8.5%	9.5%	9.8%
Percent female	25.5%	37.2%	47.8%
Percent white	78.4%	77.3%	76.1%
Percent African-American	20.5%	21.4%	22.7%
Percent other race	1.1%	1.3%	1.2%
Percent Barron's ranking "highly competitive"	3.6%	2.4%	2.6%
Percent Barron's ranking "noncompetitive"	55.7%	53.2%	53.6%
Percent first-time principals	9.9%	11.2%	13.1%
N	1967	1993	2167

Table A.2

Characteristics of First-Time Principals in North Carolina, 1990, 1995, 2000

	1990	**1995**	**2000**
Age at beginning of school year	41.5	43.9	45.1
Percent over 50	10.3%	11.2%	26%
Percent over 55	1%	1.8%	7.8%
Percent with master's degree	98.5%	100%	100%
Percent with Ph.D.	8.8%	6.3%	8.5%
Percent female	44.3%	57.2%	59.6%
Percent white	68.6%	68.3%	74.3%
Percent African-American	31.4%	29.9%	25%
Percent other race/ethnicity	0%	1.8%	0.8%
Percent Barron's ranking "highly competitive"	2.1%	1.8%	1.1%
Percent Barron's ranking "noncompetitive"	56.2%	53.6%	44.5%
N	194	223	283

Table A.3

Characteristics of Assistant Principals in North Carolina, 1990, 1995, 2000

	1990	**1995**	**2000**
Age at beginning of school year	42.6	45.3	45.3
Percent over 50	14.1%	22%	30%
Percent over 55	5.4%	7.7%	10.3%
Percent with master's degree	95.2%	99.5%	98.8%
Percent with Ph.D.	3.3%	4.2%	4.2%
Percent female	44.9%	51%	57%
Percent white	71.7%	73%	71.3%
Percent African-American	27.7%	26.4%	27.1%
Percent other race/ethnicity	0.7%	0.7%	1.4%
Percent Barron's ranking "highly competitive"	2.6%	2.9%	2.4%
Percent Barron's ranking "noncompetitive"	57.9%	55.9%	54.2%
N	1566	1757	2139

Table A.4

Characteristics of Other Administrators in North Carolina, 1990, 1995, 2000

	1990	1995	2000
Age at beginning of school year	44.8	47	47.8
Percent over 50	23.9%	30.2%	39%
Percent over 55	11.4%	12.4%	13.6%
Percent with master's degree	83%	87%	56.9%
Percent with Ph.D.	7.4%	10.6%	7.5%
Percent female	60.3%	62.9%	64.5%
Percent white	82.4%	80.4%	80%
Percent African-American	17%	18.7%	19.1%
Percent other race/ethnicity	0.7%	0.9%	1%
Percent Barron's ranking "highly competitive"	2.6%	2.6%	2.6%
Percent Barron's ranking "noncompetitive"	57%	57%	53.2%
N	902	906	2377

Table A.5

Characteristics of Superintendents in North Carolina, 1990, 1995, 2000

	1990	1995	2000
Age at beginning of school year	48.6	50	51.5
Percent over 50	39.1%	44.1%	59.8%
Percent over 55	18.5%	16.5%	22.3%
Percent with master's degree	97.7%	98.3%	93.1%
Percent with Ph.D.	39.4%	48.8%	46.7%
Percent female	20.1%	27.3%	29.1%
Percent white	87%	82.6%	80.6%
Percent African-Amerian	12%	16%	17.9%
Percent other race/ethnicity	0.9%	1.4%	1.5%
Percent Barron's ranking "highly competitive"	7.7%	6.6%	5.9%
Percent Barron's ranking "noncompetitive"	47.9%	51%	48.2%
N	432	363	364

APPENDIX B: TABLES OF MULTIVARIATE ANALYSIS RESULTS

This appendix reports descriptive statistics on the dependent and independent variables used in our multinomial logit models and presents the results of those analyses. These results are summarized in Chapter 4.

Table B.1

Career Paths of Administrators in North Carolina:
Descriptive Statistics of Variables Used in Three-Outcome Model

Variable Name	Variable Definition	Mean	Std. Dev.
Individual Characteristics			
FEMALE	Employee is female (=1)	0.817302	0.386419
AFRICAN-AMERICAN	Employee is African-American (=1)	0.154596	0.361519
AGE	Employee's age on September 1	39.76814	9.929488
AGESQ	The square of the employee's age	1680.099	805.4663
IMPUTED EXPERIENCE	Employee's imputed years of experience	11.28024	7.386087
IMP. EXPERIENCE SQ	The square of the employee's imputed experience	181.8018	192.527
HICOMPETITIVE	Employee received undergraduate degree from institution ranked "most competitive" by Barron's (=1)	0.022222	0.147399
NONCOMPETITIVE	Employee received undergraduate degree from institution ranked "noncompetitive" by Barron's (=1)	0.519217	0.499631
School Descriptors			
1988			
1989		0.069216	0.253821
1990		0.068839	0.253018
1991		0.068284	0.252233
1992		0.070637	0.256218
1993		0.072974	0.260094
1994	School year ended in year indicated (=1)	0.077074	0.26671
1995		0.079484	0.270493
1996		0.080646	0.27229
1997		0.083386	0.276466
1998		0.085074	0.278992
1999		0.087173	0.282089
2000		0.090273	0.286572
SIZE100	Number of students enrolled in school (divided by 100)	7.510021	3.865657
PCTMINORITY	Percent minority students	0.357061	0.238263
SAMERACE	Employee is the same race/ethnicity as the majority of students (=1)	0.749092	0.433536
MIDDLE	School is a middle school (=1)	0.214625	0.410562
HIGH	School is a high school (=1)	0.272094	0.445039
COMBINED	School is a combined school (=1)	0.063866	0.244514
URBAN	School is in an urban area (=1)	0.296239	0.456598
SUBURBAN	School is in a suburban area (=1)	0.20167	0.401247
WEALTH	County wealth rank (1-100)	46.53216	28.63942
Interaction Terms			

FEMALE*AFRICAN-AM	0.127316	0.333327
FEMALE*AGE	32.52798	17.80793
FEMALE*AGESQ	1375.191	975.4431
FEMALE*EXPERIENCE	9.293858	8.003688
FEMALE*EXPSQ	150.4348	188.9094
FEMALE*PCTMINORITY	0.294375	0.256545
FEMALE*MIDDLE	0.164367	0.370609
FEMALE*HIGH	0.173484	0.378665
FEMALE*COMBINED	0.054344	0.226696
FEMALE*URBAN	0.24575	0.430531
FEMALE*SUBURBAN	0.166059	0.372134
FEMALE*WEALTH	38.01096	31.53719
BLACK*AGE	6.427596	15.50858
AFRICAN-AM*AGESQ	281.8299	732.5089
AFRICAN-AM*EXPERIENCE	1.937264	5.409771
AFRICAN-AM*EXPSQ	33.01858	110.9613
AFRICAN-AM*PCTMINORITY	0.079574	0.208401
AFRICAN-AM*URBAN	0.061041	0.239406
AFRICAN-AM*SUBURBAN	0.026444	0.160451

Table B.2

Career Paths of Administrators in North Carolina:
Three-Outcome Multinomial Logit Model
Regression Results of Teacher and School Characteristics on Career Path

	Individual and School Characteristics	
Variable Name	**Drop Out**	**Become Principal**
FEMALE	0.702	-3.235
	3.05**	2.03**
AFRICAN-AMERICAN	0.111	5.812
	0.46	3.32**
AGE	0.01	0.124
	0.96	1.83
AGESQ	0	-0.002
	0.24	2.05*
IMPUTED EXPERIENCE	-0.317	0.535
	31.95**	11.63**
IMP.EXPERIENCE SQ	0.011	-0.018
	25.82**	10.56**
HICOMPETITIVE	0.377	0.244
	16.19**	1.57
NONCOMPETITIVE	-0.169	-0.003
	16.12**	0.06
1989	0.118	-0.086
	4.14**	0.68
1990	0.051	-0.05
	1.77	0.38
1991	0.099	-0.053
	3.43**	0.41
1992	0.125	-0.019
	4.51**	0.15
1993	0.22	0.204
	8.02*	1.69
1994	0.227	0.224
	8.48**	1.93
1995	0.3	0.033
	11.44**	0.28
1996	0.365	0.14
	13.69**	1.18
1997	0.394	0.537
	14.86**	4.85**
1998	0.544	0.453
	21.07**	3.93**
1999	0.59	0.536
	23.12**	4.69**
2000	0.79	0.579
	32.36**	5.12**

Variable Name	Drop Out	Become Principal
SIZE100	0.007	0.012
	3.75**	1.57
MIDDLE	0.115	−0.659
	3.48**	6.43**
HIGH	0.039	−0.805
	1.16	7.89**
COMBINED	0.084	−0.486
	1.49	3.08**
URBAN	−0.017	−0.121
	0.57	1.19
SUBURBAN	0.019	−0.003
	0.65	0.03
PCTMINORITY	0.625	−0.124
	10.31**	0.57
WEALTH	−0.002	0.004
	3.96**	3.01**
SAMERACE	0.012	−0.144
	0.65	1.74
FEMALE*AFRICAN−AM	−0.214	0.227
	6.67**	1.98*
FEMALE*AGE	−0.045	0.09
	3.74**	0.98
FEMALE*AGESQ	0	−0.001
	2.87**	1.08
FEMALE*EXPERIENCE	0.038	−0.121
	3.57**	1.86
FEMALE*EXPSQ	−0.001	0.007
	2.26*	2.89**
FEMALE*MIDDLE	−0.026	0.732
	0.76	5.72**
FEMALE*HIGH	0.077	0.77
	2.34*	6.55**
FEMALE*COMBINED	−0.128	0.027
	2.10*	0.12
FEMALE*URBAN	0.206	0.134
	6.47**	1.06
FEMALE*SURBURBAN	0.044	0.091
	1.45	0.76
FEMALE*PCTMINORITY	−0.187	0.143
	3.23**	0.65
FEMALE*WEALTH	0.001	−0.005
	1.22	2.78**
AFRICAN−AM*AGE	0.017	−0.247
	1.31	2.45*
AFRICAN−AM*AGESQ	0	0.003
	0.73	2.35*

Variable Name	Drop Out	Become Principal
AFRICAN-AM*EXPERIENCE	−0.047	0.069
	4.87**	0.93
AFRICAN-AM*EXPERIENCE SQ	0.002	−0.004
	4.94**	1.56
AFRICAN-AM*URBAN	−0.186	0.074
	5.83**	0.61
AFRICAN-AM*SUBURBAN	−0.076	−0.021
	2.00*	0.15
AFRICAN-AM*PCTMINORITY	−0.44	−0.498
	5.09**	1.56
Constant	−2.263	−10.561
	10.56**	8.64**
N	975,279	975,279

NOTE: Robust z statistics in parentheses.
 * Significant at 5%.
 ** Significant at 1%.

Table B.3

Career Paths of Administrators in North Carolina:
Descriptive Statistics of Variables Used in Two-Stage Model

Variable Name	Variable Definition	Stage 1 Mean	Stage 1 Std. Dev.	Stage 2 Mean	Stage 2 Std. Dev.
Individual characteristics					
FEMALE	Employee is female (=1)	0.8231341	0.381555	0.5538483	0.497103
AFRICAN-AM	Employee is African-American (=1)	0.152911	0.359206	0.2618567	0.439655
AGE	Employee's age on September 1	39.6733	9.959559	44.11205	7.384561
AGESQ					
	The square of the employee's age	1673.163	807.1867	1999.872	657.6952
IMPUTED EXPERIENCE	Employee's imputed years of experience	11.18321	7.398868	15.68969	5.210083
IMP.EXPERIENCE SQ	The square of the employee's imputed	179.8111		273.313	
	experience		192.5714		169.5175
HICOMPETITIVE	Employee received undergraduate degree from institution ranked "most competitive"				
	by Barron's (=1)	0.022161	0.147207	0.0259609	0.159022
NONCOMPETITIVE	Employee received undergraduate degree from institution ranked "non-competitive"				
	by Barron's (=1)	0.518677	0.499666	0.5610494	0.49627
School descriptors					
1988		0.0672033	0.250374	0.054317	0.2266086
1989	School year ended in year indicated (=1)	0.0693251	0.254006	0.0634804	0.243831
1990		0.0688785	0.2533248	0.0662783	0.248774
1991		0.068389	0.252412	0.0631135	0.243173
1992		0.0706512	0.256241	0.0699477	0.255065
1993		0.0729532	0.26006	0.0737088	0.261303
1994		0.0770238	0.266629	0.0794881	0.270505
1995		0.0794464	0.270434	0.0812769	0.273266
1996		0.080587	0.2722	0.08344327	0.276542
1997		0.0833073	0.276346	0.0875149	0.282595
1998		0.0850255	0.27892	0.088157	0.28353
1999		0.0870833	0.281957	0.0922392	0.28937
2000		0.0901265	0.286363	0.0973305	0.296414
SIZE100	Number of students enrolled in school (divided by 100)	7.492944	3.864144	8.249234	3.841086
PCTMINORITY	Percent minority students	0.3569705	0.238467	0.3614205	0.22901
SAMERACE	Employee is the same race/ethnicity as the majority of students (=1)	0.750292	0.432844	0.695028	0.460406
MIDDLE	School is a middle school (=1)	0.2135857	0.409838	0.2605724	0.438957
HIGH	School is a high school (=1)	0.2706688	0.444306	0.3363453	0.472469
COMBINED	School is a combined school (=1)	0.0641769	0.245068	0.0505458	0.219073
URBAN	School is in an urban area (=1)	0.2953898	0.456218	0.332997	0.471296

SUBURBAN	School is in a suburban area (=1)	0.2014706	0.401099	0.2093386	0.406846
WEALTH	County wealth rank (1-100)	46.56212	28.63392	45.16301	28.80869
Interaction terms					
FEMALE*AFRICAN-AM		0.1265381	0.332455	0.1605816	0.367153
FEMALE*AGE		32.7041	17.64365	24.58481	22.73456
FEMALE*AGESQ		1380.856	971.3478	1121.249	1120.065
FEMALE*EXPERIENCE		9.303078	7.983978	8.873528	8.869067
FEMALE*EXPSQ		150.2911	188.8876	157.3962	191.3371
FEMALE*PCTMINORITY		0.2962396	0.256333	0.2097146	0.251582
FEMALE*MIDDLE		0.1651365	0.371304	0.1287955	0.334981
FEMALE*HIGH		0.1743531	0.379413	0.1344831	0.341178
FEMALE*COMBINED		0.0549833	0.227948	0.0258692	0.158749
FEMALE*URBAN		0.2465286	0.43099	0.2091551	0.406715
FEMALE*SUBURBAN		0.1671262	0.373089	0.1178791	0.322472
FEMALE*WEALTH		38.32309	31.48727	23.90987	30.51133
AFRICAN-AM*AGE		6.311643	15.37762	11.62237	19.87938
AFRICAN-AM*AGESQ		276.3079	725.9679	530.2513	952.7882
AFRICAN-AM*EXPERIENCE		1.889423	5.348621	4.089009	7.376308
AFRICAN-AM*EXPSQ		32.17764	109.895	71.12742	147.4179
AFRICAN-AM*PCTMINORITY		0.0786075	0.207696	0.122666	0.233716
AFRICAN-AM*URBAN		0.0599072	0.237315	0.1108155	0.313911
AFRICAN-AM*SUBURBAN		0.0259769	0.159066	0.046693	0.210985

Table B.4

Career Paths of Administrators in North Carolina:
Two-Stage Multinomial Logit Model
Regression Results of Teacher and School Characteristics on Career Path

Variable Name	First Stage: All Who Begin as Teachers			Second Stage: Assistant Principals	
	Drop Out	Become Assistant Principal	Become Principal	Drop Out	Become Principal
FEMALE	0.688	−2.433	−6.355	5.1	−0.856
	3.00**	2.72**	1.78	0.94	0.43
AFRICAN-AM	0.124	2.395	4.747	2.861	1.728
	0.51	2.30*	1.39	0.65	0.72
AGE	0.01	0.105	0.081	0.158	0.076
	0.96	2.71**	0.63	0.59	0.87
AGESQ	0	−0.002	−0.001	−0.001	−0.001
	0.24	3.11**	0.48	0.47	1.15
IMPUTED EXPERIENCE	−0.312	0.304	0.25	−0.199	0.123
	31.20**	11.56**	2.65**	1.4	1.96
IMP.EXPERIENCE SQ	0.011	−0.013	−0.011	0.009	−0.005
	25.27**	11.39**	3.01**	1.67	2.29*
HICOMPETITIVE	0.379	0.057	0.452	0.378	−0.02
	16.19**	0.46	0.87	1.73	0.12
NONCOMPETITIVE	−0.171	0.052	0.149	0.03	0.023
	16.26**	1.36	0.92	0.32	0.41
1989	0.12	−0.233	−0.316	−0.254	0.032
	4.19**	2.76**	1.07	0.76	0.22
1990	0.053	−0.315	−0.744	−0.277	0.116
	1.83	3.62**	2.21*	0.82	0.75
1991	0.097	−0.914	−2.606	0.022	0.113
	3.35**	8.39**	3.55**	0.07	0.77
1992	0.123	−0.475	−1.02	0.269	0.04
	4.39**	5.35**	2.73**	0.94	0.27
1993	0.222	−0.377	−1.133	0.03	0.238
	8.03**	4.28**	2.93**	0.1	1.7
1994	0.229	−0.447	−1.976	0.053	0.315
	8.46**	5.04**	3.65**	0.18	2.37*
1995	0.302	−0.244	−−1.072	0.204	0.085
	11.46**	2.99**	2.92**	0.75	0.61
1996	0.367	−0.239	−0.656	0.241	0.113
	13.61**	2.93**	1.92	0.85	0.82
1997	0.394	−0.181	−0.96	0.514	0.612
	14.74**	2.25*	2.71**	1.91	4.70**
1998	0.545	−0.253	−1.056	0.568	0.519
	20.96**	3.07**	2.75**	2.10*	3.85**

Variable Name	First Stage: All Who Begin as Teachers			Second Stage: Assistant Principals	
	Drop Out	Become Assistant Principal	Become Principal	Drop Out	Become Principal
1999	0.593	-0.091	-0.882	0.489	0.547
	23.18**	1.15	2.46*	1.79	4.12**
2000	0.79	-0.053	-0.438	0.973	0.495
	32.09**	0.64	1.36	3.77**	3.68**
SIZE100	0.007	0.004	-0.189	-0.028	-0.006
	3.99**	0.69	4.96**	1.89	0.69
MIDDLE	0.115	-0.228	-0.04	-0.205	-0.329
	3.41**	2.47*	0.09	1.15	3.12**
HIGH	0.033	-0.269	0.068	-0.189	-0.066
	0.96	2.89**	0.16	1.08	0.62
COMBINED	0.076	0.067	1.127	0.158	-0.315
	1.31	0.49	2.39*	0.59	1.67
URBAN	-0.019	0.077	0.189	0.194	-0.182
	0.65	0.93	0.44	1.01	1.7
SUBURBAN	0.022	0.128	-0.228	0.018	-0.107
	0.76	1.59	0.52	0.09	0.99
PCTMINORITY	0.619	0	0.617	0.617	-0.136
	10.06**	0	0.72	1.76	0.59
WEALTH	-0.002	-0.001	0.004	0.001	0.003
	4.09**	1.85	0.78	0.21	2.09*
SAMERACE	0.009	-0.14	-0.218	0.067	-0.074
	0.52	2.20*	0.71	0.49	0.82
FEMALE*AFRICAN-AM	-0.224	0.282	-0.12	-0.059	-0.054
	6.87**	3.07**	0.27	0.29	0.46
FEMALE*AGE	-0.044	0.028	0.364	-0.242	0.018
	3.70**	0.55	1.99*	0.93	0.15
FEMALE*AGESQ	0	0	-0.005	0.003	0
	2.83**	0.59	2.37*	0.91	0.05
FEMALE*EXPERIENCE	0.034	-0.015	-0.211	0.037	0.01
	3.15**	0.45	1.72	0.25	0.11
FEMALE*EXPSQ	-0.001	0.003	0.012	-0.002	0.001
	1.94	1.97*	2.51*	0.46	0.21
FEMALE*MIDDLE	-0.024	0.576	0.243	0.098	0.176
	0.68	5.34**	0.49	0.43	1.33
FEMALE*HIGH	0.084	0.555	0.303	-0.01	-0.055
	2.50*	5.39**	0.59	0.04	0.43
FEMALE*COMBINED	-0.118	0.062	-2.575	-0.542	0.041
	1.89	0.39	2.93**	1.25	0.17
FEMALE*URBAN	0.208	0.29	-0.22	0.041	-0.073
	6.54**	2.88**	0.44	0.17	0.54
FEMALE*SUBURBAN	0.041	0.078	-0.185	-0.024	0.004
	1.35	0.81	0.37	0.1	0.03
FEMALE*PCTMINORITY	-0.182	0.04	0.006	0.041	-0.313
	3.10**	0.22	0.01	0.1	1.24

Variable Name	First Stage: All Who Begin as Teachers			Second Stage: Assistant Principals	
	Drop Out	Become Assistant Principal	Variable Name	Drop Out	Become Assistant Principal
FEMALE*WEALTH	0.001	0	−0.01	0.001	0
	1.26	0.24	1.47	0.42	0.02
AFRICAN-AM*AGE	0.017	−0.095	−0.253	−0.094	−0.038
	1.31	1.62	1.56	0.41	0.26
AFRICAN-AM*AGESQ	0	0.001	0.003	0.001	0
	0.72	1.69	1.85	0.44	0.05
AFRICAN-AM*EXPERIENCE	−0.046	0.042	0.283	−0.045	−0.077
	4.73**	1.12	1.61	0.32	0.77
AFRICAN-AM*EXPSQ	0.002	−0.003	−0.016	0	0.003
	4.82**	2.11*	2.30*	0.05	0.77
AFRICAN-AM*URBAN	−0.178	−0.118	0.047	−0.45	0.089
	5.51**	1.19	0.1	2.25*	0.7
AFRICAN-AM*SUBURBAN	−0.071	0.022	0.129	−0.069	0.009
	1.87	0.2	0.21	0.29	0.06
AFRICAN-AM*PCTMINORITY	−0.453	−0.135	−0.273	−0.271	0.362
	5.16**	0.52	0.2	0.45	0.97
Constant	−2.258	−7.403	−9.53	−7.333	−3.728
	10.60**	10.58**	3.55**	1.31	2.43*
N	953,926	953,926	953,926	21,802	21,802

NOTE: Robust z statistics in parentheses

 * Significant at 5%.

** Significant at 1%.

Table B.5

Career Paths of Administrators in North Carolina:
Descriptive Statistics of Variables Used in Superintendents' Model

Variable Name	Variable Definition	Mean	Std. Dev.
Individual characteristics			
FEMALE	Employee is female (=1)	0.8024551	
AFRICAN-AMERICAN	Employee is African-American (=1)	0.1573575	
AGE	Employee's age on September 1	40.00461	9.925598
AGESQ	The square of the employee's age	1698.886	807.4401
IMPUTED EXPERIENCE	Employee's imputed years of experience	11.45736	7.411558
IMP.EXPERIENCE SQ	The square of the employee's imputed experience	186.206	194.0479
HICOMPETITIVE	Employee received undergraduate degree from institution ranked "most competitive" by Barron's (=1)	0.0227262	
NONCOMPETITIVE	Employee received undergraduate degree from institution ranked "noncompetitive" by Barron's (=1)	0.5200212	
School descriptors			
1989		0.0692106	
1990		0.0689068	
1991		0.0681884	
1992		0.07057	
1993		0.0729644	
1994	School year ended in year indicated (=1)	0.077017	
1995		0.079479	
1996		0.0805287	
1997		0.0833239	
1998		0.0851174	
1999		0.087204	
2000		0.0904354	
DISTSIZE100	Number of students enrolled in school district (divided by 100)	259.0258	265.8323
URBAN	School is in an urban area (=1)	0.2967001	
SUBURBAN	School is in a suburban area (=1)	0.2006478	
WEALTH	County wealth rank (1-100)	46.51424	
Interaction terms			
FEMALE*AFRICAN-AM		0.1266544	
FEMALE*AGE		32.01055	18.19899
FEMALE*AGESQ		1355.878	985.7885
FEMALE*EXPERIENCE		9.17102	8.045225
FEMALE*EXPSQ		148.8332	188.8727
FEMALE*URBAN		0.2428914	
FEMALE*SUBURBAN		0.1627774	

FEMALE*WEALTH	37.26087	31.65374
AFRICAN-AM*AGE	6.578618	15.70162
AFRICAN-AM*AGESQ	289.819	744.4223
AFRICAN-AM*EXPERIENCE	1.996756	5.500577
AFRICAN-AM*EXPSQ	34.24336	113.2283
AFRICAN-AM*URBAN	0.0620756	
AFRICAN-AM*SUBURBAN	0.0267671	

Table B.6

Career Paths of School Administrators in North Carolina:
Three-Outcome Multinomial Logit Model
Regression Results of Principal Characteristics on Career Path

	Individual and District Characteristics	
Variable Name	**Drop Out**	**Become a Superintendent**
FEMALE	-0.031	-0.901
	-0.42	-0.74
AFRICAN-AM	-0.101	-1.56
	0.51	0.25
AGE	0.004	0.297
	0.48	1.41
AGESQ	0	-0.003
	1.13	1.2
IMPUTED EXPERIENCE	-0.328	0.431
	59.83**	3.26**
IMP.EXPERIENCE SQ	0.012	-0.013
	50.09**	2.61**
HICOMPETITIVE	0.39	0.93
	17.61**	2.88**
NONCOMPETITIVE	-0.152	0.099
	16.91**	0.66
1989	0.102	-0.426
	3.86**	1.59
1990	0.043	-0.366
	1.61	1.38
1991	0.084	-0.808
	3.17**	2.62**
1992	0.118	-0.853
	4.52**	2.76**
1993	0.211	-0.8
	8.33**	2.65**
1994	0.205	-1.19
	8.21**	3.43**
1995	0.282	-1.027
	11.53**	3.15**
1996	0.346	-1.178
	14.35**	3.39**
1997	0.369	-0.687
	15.49**	2.35*
1998	0.528	-1.085
	22.71**	3.22**
1999	0.565	-1.176
	24.52**	3.38**

Variable Name	Drop Out	Become a Superintendent
2000	0.766	−0.387
	34.14**	1.45
DISTSIZE100	0	−0.001
	13.93**	2.18*
URBAN	0.062	0.005
	2.69**	0.02
SUBURBAN	0.009	−0.291
	0.38	1.13
WEALTH	0	0.006
	1.23	1.9
FEMALE*AFRICAN-AM	−0.2	0.306
	7.33**	0.86
FEMALE*AGE	−0.043	−0.014
	4.60**	0.04
FEMALE*AGESQ	0	−0.001
	3.42**	0.13
FEMALE*EXPERIENCE	0.049	−0.123
	7.98**	0.65
FEMALE*EXPSQ	−0.002	0.005
	5.94**	0.71
FEMALE*URBAN	0.141	0.546
	5.77**	1.5
FEMALE*SUBURBAN	0.029	0.266
	1.06	0.61
FEMALE*WEALTH	0	−0.013
	0.6	2.31*
AFRICAN-AM*AGE	0.019	0.205
	1.65	0.6
AFRICAN-AM*AGESQ	0	−0.002
	1.02	0.53
AFRICAN-AM*EXP	−0.039	−0.363
	5.43**	1.94
AFRICAN-AM*EXPSQ	0.002	0.011
	5.50**	1.49
AFRICAN-AM*URBAN	−0.222	−0.635
	8.74**	1.64
AFRICAN-AM*SUBURBAN	−0.059	−0.157
	1.8	0.33
Constant	−1.966	−16.803
	13.42**	4.30**
N	1,020,320	1,020,320

NOTE: Robust z statistics in parentheses.
 * Significant at 5%.
** Significant at 1%.

Table B.7

**Career Paths of Administrators in North Carolina:
Descriptive Statistics of Variables Used in Attrition Model**

Variable Name	Variable Definition	Mean	Std. Dev.
Individual characteristics			
FEMALE	Employee is female (=1)	0.346913	
AFRICAN-AMERICAN	Employee is African-American (=1)	0.211362	
AGE	Employee's age on September 1	46.97752	6.586881
AGESQ	The square of the employee's age	2250.273	622.7468
IMPUTED EXPERIENCE	Employee's imputed years of experience	17.5802	5.003425
IMP.EXPERIENCE SQ	The square of the employee's imputed experience	334.0968	171.7016
HICOMPETITIVE	Employee received undergraduate degree from institution ranked "most competitive" by Barron's (=1)	0.03034	
NONCOMPETITIVE	Employee received undergraduate degree from institution ranked "noncompetitive" by Barron's (=1)	0.547093	
School descriptors			
1989		0.075693	
1990		0.076123	
1991		0.073191	
1992		0.076045	
1993		0.075263	
1994		0.075654	
1995	School year ended in year indicated (=1)	0.076827	
1996		0.076475	
1997		0.077531	
1998		0.078782	
1999		0.079681	
2000		0.082222	
SIZE100	Number of students enrolled in school (divided by 100)	5.882997	3.182437

PCTMINORITY	Percent minority students	0.35848	0.254115
SAMERACE	Employee is the same race as that of the majority of students (=1)	0.768542	
MIDDLE	School is a middle school (=1)	0.181061	
HIGH	School is a high school (=1)	0.171404	
COMBINED	School is a combined school (=1)	0.08621	
URBAN	School is in an urban area (=1)	0.254487	
SUBURBAN	School is in a suburban area (=1)	0.177425	
WEALTH	County wealth rank (1-100)	48.16659	28.47168
Interaction terms			
FEMALE*AFRICAN-AM		0.086758	
FEMALE*AGE		16.18462	22.54915
FEMALE*AGESQ		770.3861	11118.417
FEMALE*EXPERIENCE		6.037089	8.84132
FEMALE*EXPSQ		114.6123	188.0449
FEMALE*PCTMINORITY		0.13705	0.23813
FEMALE*MIDDLE		0.050319	
FEMALE*HIGH		0.025922	
FEMALE*COMBINED		0.01951	
FEMALE*URBAN		0.117645	
FEMALE*SUBURBAN		0.067483	
FEMALE*WEALTH		15.54522	
AFRICAN-AM*AGE		9.940533	19.47324
AFRICAN-AM*AGESQ		478.0065	973.4052
AFRICAN-AM*EXPERIENCE		3.683016	7.507076
AFRICAN-AM*EXPSQ		69.9186	158.676
AFRICAN-AM*PCTMINORITY		0.119387	0.255729
AFRICAN-AM*URBAN		0.076084	0.265138
AFRICAN-AM*SUBURBAN		0.02948	0.16915

Table B.8

Career Paths of School Administrators in North Carolina:
Four-Outcome Multinomial Logit Model
Regression Results of Principal Characteristics on Attrition

Variable Name	Drop Out	Stay a Principal but Change Schools	Stay in System but Not as a Principal
FEMALE	1.251	−3.135	−3.938
	0.2	1.39	1.43
AFRICAN–AM	0.974	−1.761	−0.044
	0.14	0.76	0.01
AGE	0.559	−0.146	−0.012
	2.90**	1.91	0.12
AGESQ	−0.005	0.001	0
	2.31*	1.65	0.17
IMPUTED EXPERIENCE	−0.331	0.131	−0.067
	4.57**	2.58**	1.16
IMP.EXPERIENCE SQ	0.013	−0.005	0.002
	4.39**	2.84**	0.97
HICOMPETITIVE	−0.333	−0.17	0.144
	0.18	1.29	0.93
NONCOMPETITIVE	−0.056	−0.008	0.04
	0.8	0.18	0.69
1989	−0.268	0.177	−0.032
	1.48	1.47	0.22
1990	0.001	0.535	−0.131
	0.01	4.70**	0.89
1991	−0.024	0.364	0.073
	0.14	3.08**	0.51
1992	0.237	0.542	0.076
	1.45	4.76**	0.55
1993	0.229	0.829	0.285
	1.37	7.43**	2.07
1994	0.093	0.487	0.092
	0.57	4.16**	0.67
1995	0.072	0.251	−0.033
	0.42	2.13**	0.24
1996	0.152	0.441	0.056
	0.9	3.85**	0.41
1997	0.037	0.308	0.378
	0.22	2.62**	2.87**
1998	0.467	0.233	0.174
	2.96**	1.97*	1.26
1999	0.261	0.318	0.022
	1.63	2.71**	0.16
2000	0.539	0.305	0.057
	3.54**	2.62**	0.41

Variable Name	Drop Out	Stay a Principal but Change Schools	Stay in System but Not as a Principal
SIZE100	0.004	−0.035	0.008
	0.37	3.97**	0.83
MIDDLE	−0.092	0.304	0.278
	0.88	4.45**	2.87**
HIGH	−0.187	0.042	0.618
	1.56	0.52	6.79**
COMBINED	−0.408	−0.164	0.179
	2.94**	1.58	1.45
URBAN	0.277	0.271	−0.223
	2.44*	3.38**	2.06**
SUBURBAN	0.069	0.032	−0.093
	0.66	0.4	0.93
PCTMINORITY	0.246	0.681	0.958
	0.98	4.16**	4.69**
WEALTH	−0.003	0	−0.003
	2.03*	0.06	2.17*
SAMERACE	−0.212	−0.13	−0.042
	1.82	1.83	0.47
FEMALE*AFRICAN−AM	−0.149	0.028	0.098
	0.74	0.25	0.69
FEMALE*AGE	−0.051	0.151	0.216
	0.19	1.2	1.44
FEMALE*AGESQ	0	−0.002	−0.003
	0.05	1.16	1.56
FEMALE*EXPERIENCE	0.047	−0.068	−0.01
	0.45	0.88	0.12
FEMALE*EXPSQ	−0.001	0.004	0.001
	0.28	1.31	0.42
FEMALE*MIDDLE	0.438	−0.204	0.027
	2.40*	1.74	1.18
FEMALE*HIGH	−0.254	0.063	0.249
	0.93	0.39	1.66
FEMALE*COMBINED	0.69	0.402	0.002
	2.45*	2.39**	0.01
FEMALE*URBAN	−0.337	−0.168	0.045
	1.83	1.44	0.3
FEMALE*SUBURBAN	−0.154	0.096	−0.275
	0.83	0.8	1.77
FEMALE*PCTMINORITY	−0.023	−0.129	−0.234
	0.07	0.6	0.9
FEMALE*WEALTH	0.003	0.002	0.001
	1.12	0.9	0.48
AFRICAN−AM*AGE	0.016	0.125	0.038
	0.05	0.99	0.21
AFRICAN−AM*AGESQ	−0.001	−0.001	−0.001
	0.16	0.91	0.26

Variable Name	Drop Out	Stay a Principal but Change Schools	Stay in System but Not as a Principal
AFRICAN-AM*EXPERIENCE	−0.108	−0.046	−0.082
	0.97	1.84	0.82
AFRICAN-AM*EXPSQ	0.003	0.004	0.003
	0.76	1.48	0.78
AFRICAN-AM*URBAN	−0.064	−0.108	−0.298
	0.35	0.94	1.99*
AFRICAN-AM*SUBURBAN	0.248	0.146	0.006
	10.5	0.97	0.03
AFRICAN-AM*PCTMINORITY	0.307	−0.009	0.203
	0.61	0.03	0.55
Constant	−17.177	0.365	−2.488
	3.89**	0.26	1.39
N	25,577	25,577	25,577

NOTE: Robust z statistics below coefficients.

 * Significant at 5%.
** Significant at 1%.