

TECHNICAL  
REPORT

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Career Paths of School  
Administrators in Illinois

Insights from an Analysis of  
State Data

JEANNE RINGEL, SUSAN GATES,  
CATHERINE CHUNG, ABIGAIL BROWN,  
BONNIE GHOSH-DASTIDAR

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201 North Craig Street, Suite 202, Pittsburgh, PA 15213-1516

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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 to support this concern. 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 Illinois State Board of Education were used to assess the careers of school administrators in the state of Illinois. 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 North Carolina (Gates et al., 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. Illinois, North Carolina, and New York represent a fairly broad variation in market conditions and population trends.

The primary audience for these three related reports is most likely educational researchers and some education policymakers at the national, state, and local levels. These reports not only convey information about the current state of the market for school administrators in North Carolina, New York, and Ohio, they also demonstrate the ways in which state-level administrative data might be

used to address crucial questions 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 earlier 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.

This research was funded by the Wallace Foundation and was conducted within RAND Education, a division of the RAND Corporation. This research effort reflects RAND Education's mission to bring accurate data and careful, objective analysis to the national debate on education policy.

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CONTENTS

Preface.....	iii
Figures.....	ix
Tables.....	x
Summary.....	xi
Acknowledgments.....	xix
1. Introduction.....	1
Objectives.....	3
Data.....	5
Definitions.....	6
Scope.....	8
Factors Affecting the Labor Market for School Administrators in Illinois.....	11
Report Organization.....	18
2. Descriptive Analysis of Illinois School Administrators.....	19
Characteristics of Illinois School Administrators.....	20
The Average Age of School Administrators in Illinois Has Increased.....	21
Women Make Up a Growing Fraction of the State's School Administrators.....	21
The Proportion of Minority Principals Has Increased.....	23
The Salaries of Administrators Have Increased Steadily Over Time.....	24
Description of Career Paths into the Principalship.....	24
Cohort Analysis of First-Time Principals.....	26
Summary.....	27
3. Methodology for Examining Career Transitions.....	30
Multinomial Logit Modeling Approach.....	33
Applying the Model to Our Problems.....	35
Interpretation of Analytical Results.....	41
4. Summary of Results from the Models for Illinois.....	45
Analysis of Transition to the Principalship.....	45
Illinois Two-Stage Analysis: Transition to Assistant Principalship, and Transition from Assistant Principalship to Principalship.....	48
Transition to Superintendency.....	53
Model of Principal Mobility and Attrition.....	55
5. Discussion and Conclusions.....	59
Descriptive Overview Suggests Modest Growth and Demographic Shifts in the Population of Illinois School Administrators.....	59

Analysis of Factors Related to the Transition to Administration Provides Additional Insights on Career Paths.....	61
Rates of Turnover Among Principals in Illinois Vary by School Characteristics .....	65
Lack of Data on the Quality of Administrators Is a Serious Limitation of Administrative Data.....	67
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 to Improve Student Learning.....	68
Appendix A: Additional Descriptive Analysis Figures and Tables.....	73
Appendix B: Tables of Multivariate Analysis Results .....	85
References.....	109

**FIGURES**

1.1	Illinois Population, 1980-2000, by Region .....	12
2.1	Number of Administrators in Illinois, by Type and Year .....	20
2.2	Proportion of Illinois Educators Who Are Female .....	22
2.3	Proportion of Illinois Educators Who Are Minority .....	23
2.4	Position Held Six Years After First Principalship, 1987-1993 Cohorts, Statewide.....	27
A.1	Age Distribution of All Principals in Illinois, 1990-1991 and 2000-2001.....	73
A.2	Age Distribution of First-Time Principals in Illinois, 1990-1991 and 2000-2001.....	74
A.3	Proportion of Illinois Principals Who Are Female, by Grade Level .....	74
A.4	Proportion of Illinois Principals Who Are Minority, by Grade Level .....	75
A.5	Salary of Illinois Administrators, by Type and Year .....	75
A.6	Career Paths Followed by First-Year Principals, 1987-1999 Cohorts .....	76
A.7	Career Paths Followed by First-Year Principals, 1987-1999 Cohorts, by Region.....	76
A.8	Career Paths Followed by First-Year Principals, 1987-1999 Cohorts, by School Size.....	77
A.9	Position Held Six Years After First Principalship, 1987-1993 Cohorts, Chicago Only.....	78

**TABLES**

3.1	Summary of Analytical Models .....	34
3.2	Independent Variables Included in Regression Analyses .....	42
A.1	Characteristics of All Principals in Illinois, 1990, 1995, 2000.....	79
A.2	Characteristics of First-Time Principals in Illinois, 1990, 1995, 2000.....	80
A.3	Characteristics of Assistant Principals in Illinois, 1990, 1995, 2000.....	81
A.4	Characteristics of Other Administrators in Illinois, 1990, 1995, 2000.....	82
A.5	Characteristics of Superintendents in Illinois, 1990, 1995, 2000.....	83
B.1	Descriptive Statistics of Variables Used in Three-Outcome Model.....	86
B.2	Career Paths of Administrators in Illinois: Three-Outcome Multinomial Logit Model Regression Results of Teacher and School Characteristics on Career Path .....	89
B.3	Career Paths of Administrators in Illinois: Descriptive Statistics of Variables Used in Two-Stage Model .....	92
B.4	Career Paths of Administrators in Illinois: Two-Stage Multinomial Logit Model Regression Results of Teacher and School Characteristics on Career Path .....	95
B.5	Career Paths of Administrators in Illinois: Descriptive Statistics of Variables Used in Superintendents Model .....	97
B.6	Career Paths of Administrators in Illinois: Three-Outcome Multinomial Logit Model Regression Results of Principal Characteristics on Career Path .....	99
B.7	Career Paths of Administrators in Illinois: Descriptive Statistics of Variables Used in Attrition Model .....	101
B.8	Career Paths of Administrators in Illinois: Four-Outcome Multinomial Logit Model Regression Results of Principal Characteristics on Attrition .....	103

**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 are 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 Illinois. 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 school 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 level 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 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. As a consequence, districts and states found that they would benefit from knowing what 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 question, 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. 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 Illinois data. The first of our four research objectives was to provide a descriptive overview of current and former Illinois 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 factors of the individual and the school in which he or she works that are related to whether or not 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 we 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 ILLINOIS SCHOOL ADMINISTRATORS HAVE CHANGED AS THEIR NUMBERS HAVE INCREASED MODESTLY**

Our analysis revealed modest growth in the number of school administrators in Illinois, but not as a result of increases in the number of principals and superintendents. Between 1987 and 2001, the total number of school administrators grew by 21 percent (which is slightly lower than the 24 percent increase in the number of teachers during this timeframe), but this growth was not evenly distributed across administrative positions. We found that while the number of assistant principals increased by 71 percent and the number of other administrators grew by 36 percent, the number of school principals increased by only 10 percent and the number of superintendents actually declined by 5 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 Illinois transition from teaching to the principalship. A survey of those obtaining administrative (T75) certificates in Illinois in the 1999-2000 school year (DeAngelis, 2003) also supports the notion that there is no supply crisis. Of the approximately 1,400 individuals who received the T75 certification in 1999-2000, seven out of ten had applied for an administrative position, but only four out of ten were actually working as administrators.

Female representation among all categories of school administrators in Illinois grew dramatically between 1990 and 2000. Even within the superintendency, where female representation is the lowest for the administrative positions considered, 14.4 percent of superintendents were women in 2000, compared with only 6.3 percent ten years prior. As for Illinois's principals, only 26 percent were female in 1990; but by 2000, women, at 46.6 percent, were nearly a majority. This trend is supported by a similar increase in the proportion of new principals (i.e., principals in their first year) who were women. By 2000, women were a clear majority--61 percent--of the state's new principals.

The proportion of principals who are minorities (i.e., members of a racial or ethnic minority group) has also increased over time. In 1990, only 12 percent of Illinois principals were minorities; by 2000, 18 percent were.

#### **CAREER PATH ANALYSES REVEAL 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 workforces. 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. When we controlled for other characteristics, men were still three times more likely to become principals overall. When we accounted for the possibility of becoming an assistant principal, we found that men were nearly 2.5 times more likely to become principals directly (that is, without first serving as an assistant principal), and over 2.5 times more likely to become assistant principals. However, we also found that conditional on having become an assistant principal, women were nearly 20 percent more likely to become principals. This suggests that the source of the gender barrier may lie at the point where the individual makes the initial decision to move from teaching into administration. In addition, the results of our analysis suggest that the gender gap is not a problem specific to high schools. Women represented well over half of the principals in both elementary and combined schools, but only 31 percent of middle school principals and 26 percent of high school principals in 1999-2000. However, relative to women in elementary schools, women in middle and high schools are actually more likely to become principals or assistant principals. 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. Here, the concern is not with the rate at which teachers transition into administration, but with the pool from which administrators come. In the 1999-2000 school year, minorities made up a total of about 41 percent of the entire student population of Illinois, compared to only 15 percent of the teaching force, 19 percent of all principals, and 4 percent of all superintendents. In contrast to what was found for gender representation, minorities were found to be underrepresented in the teaching pool relative to the overall population, but well represented in school administration relative to the teaching pool. Overall,

however, our analyses provided no evidence that African-Americans are either more or less likely than whites to become principals.

**PRINCIPAL TURNOVER IS NOT PARTICULARLY HIGH IN ILLINOIS, BUT GREATER TURNOVER IS FACED BY 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 high level of stability in Illinois schools. After six years, 60 percent of these individuals were still principals in the state of Illinois; and of these principals, 38 percent were still principals in the same school, and 22 percent had assumed a principalship at another Illinois public school. Of those who moved to another public school, about half remained in the same district and half changed districts. A very small fraction, 3 percent, of the first-time principals had returned to teaching six years later; 15 percent had assumed some other administrative position; and about one-fifth had left the Illinois public school system.

Our multivariate analysis of principal turnover also suggests stability. Over the timeframe 1987-2001, turnover among all school principals was 14 percent, and only about one-fifth of it was attributable to principals leaving the system. However, we did observe some interesting variation by school characteristics. 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.

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

Our research is perhaps most illustrative, however, in identifying 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.

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## 1. INTRODUCTION

In recent years, the possibility that there might not be enough personnel to fill administrative positions in public K-12 school systems has been of concern to policymakers. Anecdotal reports that some districts were scrambling to fill such positions by enticing retired administrators to return on a temporary basis or by employing uncertified individuals spurred these concerns, 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 be facing a general shortage of school administrators was called into question by three recent empirical studies. A RAND 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 there are more than enough individuals working in the New York state education system who 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 principal shortages were not common and that the average number of applicants for each open principal position was 17. The authors of this study also suggest that the hiring practices of school districts may be excessively emphasizing experience.

While these studies provide 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 schools and districts to fill available administrative slots varies significantly. And there is the issue of how sufficient a means certification is by itself for 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 the state of Illinois. The analysis of career paths sheds light on several questions of interest to the state and districts. Public sector organizations often place value on the racial 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 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 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 school quality, which is being measured by improvements in student achievement for all subpopulations of students. In pursuing this goal, 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 question, as well.

This report addresses these issues for Illinois. A companion report, by Gates et al. (2004), addresses similar issues for North Carolina; 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.<sup>1</sup> 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 that 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.

#### **OBJECTIVES**

This report documents the analytical results of our study, in which we used state-level administrative data to examine the career paths of

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<sup>1</sup> In our 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 had data only from the mid-1990s, so our ability to do longitudinal analyses was limited. However, some 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—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.

school administrators. Our analysis had four research objectives that relate to a number of policy questions.

The first objective of our research was to provide a descriptive overview of current and former Illinois school administrators and their careers. Although this overview is more limited than that in Gates, Ringel, and Santibañez (2003) because it focuses solely on administrators in one state, it nevertheless expands on that earlier, descriptive 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 follows 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 or not that individual makes the transition to a principalship or superintendency.

Our third research objective was to identify characteristics associated with principal 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/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 that are 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 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 reaching this larger objective.

#### **DATA**

Our analysis of the careers of Illinois school administrators is based on Teacher Service Record and Teacher Certification data provided to us by the Illinois State Board of Education (ISBE). These data contain employment and certification information for each individual employed in public K-12 education in the state of Illinois. The fact that individual records are linked across years allowed us to examine the career trajectory of individuals.

The data cover FY 1978 through FY 2001 for personnel employed in the Chicago school district and FY 1971 through FY 2001 for personnel employed outside that district. However, no data were available for FY 1985 in Chicago and for FY 1985 and FY 1986 in the rest of the state. For each individual, we have the following information for each year in which he/she was employed: age, gender, race/ethnicity, experience in the Illinois public school system, the position held each year, regional information, the school and/or district in which he/she was employed, salary, contract length, the name of the undergraduate institution attended,<sup>2</sup> and certificates held.<sup>3</sup>

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<sup>2</sup> The data file includes the name of the undergraduate institution attended only if that institution is in the state of Illinois. For individuals who attended a college or university outside of Illinois, we know only the state where they attended. Twenty-five percent of the sample attended an out-of-state institution.

<sup>3</sup> The data for each individual includes information on only the two certificates that are most relevant to the current position. This made

This state information has been merged with data from the U.S. Department of Education's Common Core of Data (CCD) on schools and districts, which provides additional information about the school, the district, and the local community, such as student demographics (from 1987 onward) and enrollment. We also coded information from the 1986 Barron's ranking of college quality to create a measure of the quality of the undergraduate institution that an individual had attended.

Administrative data such as these have pluses 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 every individual who works in a professional capacity in the Illinois state 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 the ability to link records of individuals over time. This allowed us to examine actual career movement rather than make deductions about career movement based on changes in average population.

On the negative side, administrative data's usefulness is limited by the fact that such data are collected to meet administrative needs rather than research interests. In the case of state educators, the data are collected primarily to maintain the information needed to calculate retirement benefits, to provide counts of the 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.<sup>4</sup>

#### **DEFINITIONS**

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

The data contain information on individual experience in Illinois public schools, so any use of the term *experience* must be understood in that context. Individuals may have worked in private schools, and/or

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it difficult for us to conduct estimates related to the reserve pool of certified administrators.

<sup>4</sup> Administrative records can incorporate quality-related information, such as the results of performance evaluations.

they may have worked in public schools in other states; we have no information on that type of educational experience. Individuals are considered to have left the Illinois system when they no longer show up in our data.

We use the terms *new principals* and *first-time principals* to describe individuals who are in their first year in a principalship in Illinois.

We consider three separate geographic regions for Illinois in our analyses: Chicago, collar counties, and downstate, because these are used by policymakers when discussing Illinois. (These three geographic regions are rough approximates for urban, suburban, and rural.) For the purposes of this report and in keeping with the traditional partitioning of the state, suburban Cook County is combined with the surrounding collar counties.

As a political region, downstate is fast becoming too heterogeneous to be called a coherent region any more. Although still largely rural, it has cities (such as Peoria and Rockford) that look like microcosms of Chicago, with their own suburbs and issues with respect to changing racial demographics. In other words, diversity and equity issues related to racial and ethnic groups are now no longer limited to Chicago (Nowlan, 1999, p. 6). To account for changes, we consider three urbanicity distinctions—urban, suburban, and rural—in addition to the three regional distinctions. In our multivariate analyses, we opted to use a five-part region-urbanicity variable that combines the regional and urbanicity measures and can take on the following values: urban Chicago, suburban Chicago, urban other, suburban other, and rural.

We have adjusted salary information for inflation (we report figures in year 2000 dollars). Salary information has also been annualized to adjust for the number of months per year an individual works.

Finally, the term *cohort* is used in this report to mean a group of individuals who all enter the principalship (or in some cases, another position) in the same school year.

#### SCOPE

As mentioned above, while the data provide a comprehensive understanding of the careers of all professional public school personnel in the state, they lack direct measures of performance or quality. Data analyses using these administrative records thus can inform policymakers about questions such as: How have the characteristics of administrators changed over time? Who becomes an administrator? What types of schools have higher or lower turnover rates? They cannot, however, 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.

The inability to assume that the public sector education system promotes and retains the highest-quality or most-effective individuals has important implications for our analyses. Without such quality or performance information, it is impossible to conclude whether the right individuals are being promoted, and whether the turnover observed is bad (successful individuals leaving after a short stay) or healthy (schools getting rid of poor performers).

Our analyses are thus limited by the information lacking in the administrative data sets. As a proxy for individual quality, we examined the ranking of the undergraduate institution attended by the individuals, and each individual's education and experience. We want to make it clear, however, that there is no evidence to suggest that individuals who attend highly competitive colleges make better school leaders than individuals who attend noncompetitive colleges. There is research (Brewer, Eide, and Ehrenberg, 1999; Fitzgerald and Burns, 2000) showing that individuals who attend very, or highly, competitive colleges have higher lifetime earnings. So even if we cannot say that individuals who attend highly competitive colleges make better principals, we can surmise that they have better labor market opportunities outside of education compared with those who attend noncompetitive colleges.

With the recent No Child Left Behind (NCLB) legislation and the more general state-level emphasis on accountability, data linking 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 hinges 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 the school are inadequate for measuring the effectiveness of a principal, much less teachers. Some people have proposed using teacher turnover as a measure of principal effectiveness, with high teacher turnover reflecting poor leadership skills on the part of a principal who drives teachers away. The problem with this measure is that high teacher turnover may just as readily be interpreted as a positive thing, if one assumes that an effective principal encourages poorly performing teachers to leave. Here again, unless we have a measure of whether teachers are effective, it is impossible to conclude that teacher turnover is problematic. Additional information, such as performance evaluations using systematic evaluation tools, could be

married with administrative data to provide insights on the career paths of successful administrators.

Another important limitation of our analyses stems from the fact that the data we used are solely for all individuals working in the Illinois state public education system, and thus do not include those who work in private schools or some charter schools in the state. An individual who stops working for the public school system simply drops out of our data set—regardless of whether that person has retired, died, left the workforce entirely, or left to work in a public school or charter school.<sup>5</sup>

Finally, because our analyses are based on data that cover only individuals working in Illinois—which is only one of the 50 states—to what extent should the results be interpreted to shed light on challenges more generally? There are several reasons to focus attention on Illinois, all of which stem from the fact that Illinois is somewhat a microcosm of the United States as a whole. The state public education system includes a big city urban district, as well as rural districts in small communities with shrinking populations; it also includes smaller urban and suburban districts. An example of a Midwestern “rust belt” state, Illinois has experienced moderate population growth after population stagnation in the 1980s. Moreover, as is true in many U.S. states, Illinois’s population is shifting from urban and rural areas to suburban sprawl. The state’s average spending per pupil is in the middle of the pack in terms of U.S. states, but Illinois has one of the greatest degrees of interdistrict variation in per-pupil spending. Illinois also has a tremendous number of school districts—896 in 1999–2000—and many of them are quite small. And although Illinois includes the third largest school district in the country (Chicago, with

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<sup>5</sup> In the 2000–2001 school year, Illinois had 21 charter schools and ranked 19<sup>th</sup> 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 states had no charter schools (see <http://www.stateline.org>). Some, but possibly not all, charter schools are included in the state data file.

over 430,000 students), its average number of students per district is 2,263, compared with 3,573 for the United States as a whole.<sup>6</sup>

North Carolina, which is the subject of a similar analysis in a companion report (Gates et al., 2004), provides a useful contrast to Illinois. Like Illinois, North Carolina contains a wide range of urban, suburban, and rural districts; but, unlike Illinois, its state public education system is more centralized, with only 120 districts in 1999-2000 according to the CCD. The average number of students per district in North Carolina is 10,633—much higher than the national average—and the state is experiencing rapid population growth. Average per-pupil spending is low, but so is the variation of average per-pupil spending across districts. Additionally, North Carolina has been in the forefront of state educational accountability initiatives.

To help readers interested in the extent to which Illinois can be viewed as similar to or different from other states, the next section provides general background information on factors that influence the labor market for school administrators.

#### **FACTORS AFFECTING THE LABOR MARKET FOR SCHOOL ADMINISTRATORS IN ILLINOIS**

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.

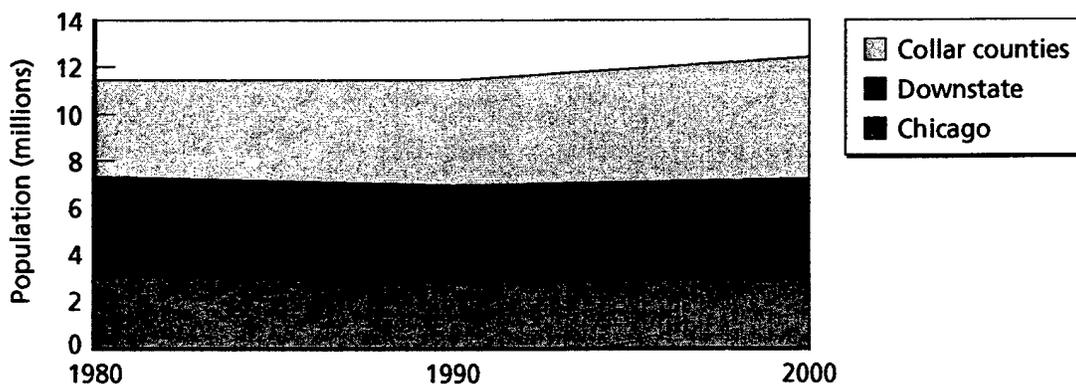
##### **Population Growth**

Figure 1.1 shows the population of Illinois, by region, from 1980 to 2000. In 2000, the state's population stood at 12.4 million, representing 4.2 percent of the U.S. population at that time. During the 1980s, Illinois's overall population hardly grew at all, but both Chicago and downstate lost people to the collar counties, resulting in a 27 percent growth for those counties. In the following decade, from 1990 to 2000, the state grew approximately 8.6 percent, which was below the

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<sup>6</sup> District size information was calculated based on CCD information for the 1999-2000 school year. When Chicago is excluded, the average per-district size for Illinois is 1,783 students.

national population growth rate of 13.2 percent. All three Illinois regions experienced population growth during that decade, but the collar counties accounted for 73 percent of the state's total population growth.<sup>7</sup> Chicago remains the third-largest U.S. city, and its population of 2.9 million in 2000 reflects a 4 percent growth over its 1990 population (Perry and Mackun, 2001).



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**Figure 1.1—Illinois Population, 1980–2000, by Region**

Along with their disproportionate population growth, the collar counties diversified racially (Nowlan, 1999, p. 5), the largest change being that African-Americans moved out of Chicago proper and into the collar counties. The racial breakdown in the rest of the state also changed. From 1980 to 2000, both the Hispanic and Asian populations more than doubled in the Chicago and collar counties combined. Asians and Hispanics were the fastest-growing racial and ethnic populations in Illinois schools (Roderick, n.d.). In the 1999–2000 school year, minorities made up about 39 percent of the entire student population of Illinois (Illinois State Board of Education, 2000).

Along with these shifts in population, Illinois made some efforts at school and district consolidation, primarily in rural areas. There are a number of extremely small school districts in rural areas of the

<sup>7</sup> See <http://eire.census.gov/popest/archives/county/cas/cas17.txt?PHPSESSID=b330f1c39158c11a34e4c12dc85ee441>.

state, and the topic of district consolidation has been raised numerous times since the 1950s. Consolidation often occurs in times of tight state and local budgets, when fiscal realities become more salient than underlying resistance to change (see Ward, 1992; Eaton, 1994; and Olsen, 2002). Consolidation was a hot topic in the late 1980s and again in recent years.

These population shifts and consolidation drives may imply shifts in the overall demand for school administrators, with growing demand in Chicago and the collar counties, and shrinking demand in the rural areas. The increased presence of racial and ethnic minorities in the collar counties may also increase the demand there for minority administrators.

#### **State Certification Requirements**

To become an administrator in Illinois, one must first become certified for the position. Certificates are provisional for two years and then convert to a Standard Certificate. To qualify for the Illinois administrative certificate, the candidate must have a master's degree and must complete a program of preparation for one or more of the four administrative endorsements: General Supervisory, General Administrative, Chief School Business Official, and Superintendent. To become a principal, an assistant principal, or an assistant or associate superintendent, one must have the General Administrative endorsement. In addition, one must have two years of full-time teaching experience or school service personnel experience and must successfully complete the certification examinations (Illinois State Board of Education, 2003). As a result of these requirements, we would expect to see most, if not all, school administrators in Illinois having a master's degree and at least two years of experience.

While Illinois administrators do not have tenure, the tenure rules for teachers impact the incentives structure for administrators. For a teacher to win tenure, he/she must have standard certification (which requires four years of experience) and must be recommended for tenure. Tenure is a state designation, so teachers retain tenure when they move across districts. Any teacher who accepts a principalship loses his/her teaching tenure if the new position is in a different district or if

he/she signs a contract for a period longer than one year (Mulhall, Hartter, and Camp, 2003; Weissman, 1999). These tenure rules would seem to limit the mobility of school administrators, given that there are substantial risks involved in taking a position in a different district.

Since 1980, the Chicago public school system has had a residency rule for its employees, which was extended to new principals in 1996 (*Chicago Public Schools Policy Manual*, 2001). Residency requirements of this sort would be expected to limit the mobility of educators, especially since they limit the Chicago school district's ability to hire individuals from other districts.

#### **Compensation and Retirement Benefits**

The Illinois Supreme Court outlawed principal unionization, so there are no official administrator unions in Illinois. There are, however, administrator "associations" that fill a similar role in some districts. These associations vary in their roles--some help administrators in their collective bargaining; others are much less active--and membership is not mandatory. Compensation is determined at the district level. Illinois principals are fairly well paid relative to their counterparts in other states, and the salary differential between principals and teachers in Illinois is about average compared with that in other states (Gates, Ringel, and Santibañez, 2003). Thus, we would not expect salary issues to be leading to supply problems in Illinois's market for school administrators.

There are two retirement systems in Illinois: one for Chicago and another for the rest of the state, and each one covers both teachers and administrators. The systems have different contribution rules (discussed below), but they have been synchronized, so it is possible to transfer years of service across the systems. Participation is mandatory in both systems. The Public School Teachers' Pension and Retirement Fund of Chicago is distinct from the Teachers Retirement System that covers the rest of the teachers and administrators in Illinois. Total contributions to an individual's retirement fund under both systems are equal to 9 percent of the member's income; but the teachers' share in the Chicago system is only 2 percent, compared to 7 percent in other areas (*Public School Teachers' Pension and Retirement Fund of Chicago*, 2000; *Teachers'*

Retirement System of the State of Illinois, 2003). The statewide retirement system should foster interdistrict mobility, although the distinction between the Chicago system and that for the rest of the state may create barriers to movement into and out of the Chicago school system.

The retirement systems for public school personnel allow for full retirement at 55 for an individual with 35 or more years of service. In addition, there is an early retirement option available through 2005 for those who are 55 and have 20 or more years of service.<sup>8</sup> In 1994 and 1995, the state offered early retirement incentives to teachers and administrators nearing retirement age in the hopes of replacing them with younger, less costly workers (Illinois State Board of Education, 2002a). The retirement system provides fairly strong incentives for individuals to retire in their late 50s. The key effects we would expect to see from the early retirement incentives are higher rates of turnover in 1994 and 1995 and a decline in the average age of administrators.

#### **Illinois School Finance**

School finance issues can affect the state labor market for school administrators if the districts' ability to pay school administrators varies substantially. Schools in Illinois are financed by federal, state, and local funds, with federal funds being distributed by the state. For Illinois public schools, the revenues for the 2000-2001 school year totaled an estimated \$18 billion. The federal portion was 10 percent, the state portion was 38 percent, and the local share was an estimated 52 percent (Illinois State Board of Education, 2002b, p. 1).

Federal financial support is provided through grants and reimbursements directed toward the support of students from low-income households and distributed by the state to local school districts. The two largest federal funding sources are for special education and school food programs. The amount of state funding that the General State Aid formula provides to each school district varies with the district's relative wealth and total enrollment. This accounts for the majority of

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<sup>8</sup> See <http://www.tr.s.state.il.us/subsections/publicationsforms/pubs/member/bro04.htm>.

state funding. Other state financial support is provided by categorical and special program grants and grants for school reform and improvement initiatives, most of which were enacted in 1985. The primary source of local funding for Illinois schools is the local property tax (Illinois Association of School Boards, n.d.).

On average and adjusted for regional differences, the amount of money the Illinois public schools spent per pupil in 2001 was \$6,968. This places Illinois squarely in the middle of the pack—number 27 in a ranking of 50 states.<sup>9</sup>

The amount of funding provided by the state has varied through the years. State funding accounted for almost half the school budget in the late 1970s, but then dipped, reaching less than a third in 1995 before rising to its current level of 38 percent (Ward, 2000). Despite efforts to promote equity (Goldberg, 2000), disparities in per-pupil spending have continued: in 2000, the wealthiest school district spent \$17,306 per student, while the poorest spent only \$4,177.<sup>10</sup> After adjusting for regional differences and student need, Illinois has the third largest gap in per-pupil spending between the highest- and lowest-spending districts.<sup>11</sup>

Stark variation in the level of school financing may lead to greater heterogeneity in administrators' salaries across schools and districts, as well as in the schools' and districts' ability to recruit and retain school administrators and other school personnel. This variation may be tempered by differences in job opportunities in the local area and in the cost of living.

#### **State Education Reform Initiatives**

Before 1985, state policies on education focused mostly on facility and immunization issues. With the Illinois Educational Reform Act of 1985, however, the policy focus shifted to achievement standards, performance, and accountability. This new focus has changed the stresses

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<sup>9</sup> <http://www.stateline.org/stateline/?pa=fact&sa=showAllFacts#issue124>.

<sup>10</sup> <http://home.comcast.net/~educintel3/Illinois.pdf>.

<sup>11</sup> <http://www.stateline.org/stateline/?pa=fact&sa=showAllFacts#issue124>.

and the opportunities associated with being a principal and may affect people's decisions to embark on the path to upper-level administrative positions (Report of the Chicago Assembly, 1998).

Chicago is a special district in many ways. It was the state's largest single district, with 437,418 students, in 2001; it accounted for 23.4 percent of the total student population in 2002; no one racial or ethnic group has a majority there; and it serves some of both the poorest and wealthiest neighborhoods in the state.<sup>12</sup>

The Chicago School Reform Act of 1988 initiated sweeping reforms to decentralize authority and reshape the principal's role (Report of the Chicago Assembly, 1998). A centerpiece of the act was the creation of local school councils (LSCs). Each LSC comprises six elected parents, two elected community members, two teachers, and the principal, as well as one elected student for councils directing high schools. All LSCs are responsible for hiring and firing principals, helping the principal develop and approve the school budget, and developing the school improvement plan (SIP). They are also responsible for monitoring the SIP's implementation and developing other local initiatives.

The Chicago School Reform Act stripped principals of tenure, replacing the tenure system with four-year contracts that are subject to review by the local school council.

The Reform Act did not achieve all that its promoters had hoped for, though, and had some unintended consequences (World Bank, n.d.). The LSCs had little accountability to anyone, so a bad LSC was difficult to counter. Moreover, principal turnover rates became very high, and local constituencies often dominated the principal selection process. In response to these problems, the city passed the Chicago School Reform Amendatory Act in 1995, the purpose of which was to re-centralize aspects of the system and give the mayor significant power to control policy. This act also established the Chicago Schools Academic Accountability Council and the Office of Accountability, two bodies charged with ensuring accountability throughout the system, including in the LSCs. The LSCs have retained the power to hire and fire principals, but they now must follow centrally developed guidelines, and they are

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<sup>12</sup> See <http://www.nces.gov>.

accountable to the board for student learning outcomes and efficient resource use.

**REPORT ORGANIZATION**

The first three key research objectives form the structure for this report, and the fourth key objective is addressed through a synthesis of insight 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 and, in doing so, addresses the second and third research objectives. Chapter 5 provides a discussion and conclusions and addresses the fourth research objective.

## 2. DESCRIPTIVE ANALYSIS OF ILLINOIS SCHOOL ADMINISTRATORS

There were many parts to our descriptive analysis of Illinois's public schools. We examined a wide variety of cross-tabulations that included school and regional characteristics, as well as the individual characteristics of school administrators. We also examined trends over time for the demographic characteristics of school principals, assistant principals, other administrators,<sup>13</sup> and superintendents.<sup>14</sup> We explored overall trends in the number of school administrators in the state as a reflection of the demand for school administrators, and, because public school educators are eligible to retire at a relatively young age in Illinois, we explored trends in the age of school administrators. Since, as mentioned in the introduction, policymakers may be interested in gender equity and racial diversity among school administrators, we explored trends in these areas as well.

We then focused on school principals and superintendents, examining the positions they held prior to becoming a principal or superintendent. Our goal for this analysis was to identify typical career paths and to determine whether they had changed over time. Among other things, an analysis of career paths can help in determining whether schools and districts are 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 principals in the years following their assumption of the principalship to provide an initial sense of how much turnover there is among Illinois school leaders.

This descriptive overview highlights issues that were worthy of further consideration through multivariate analysis (see Chapter 4). We do not discuss the implications of trends here, however. Those and the

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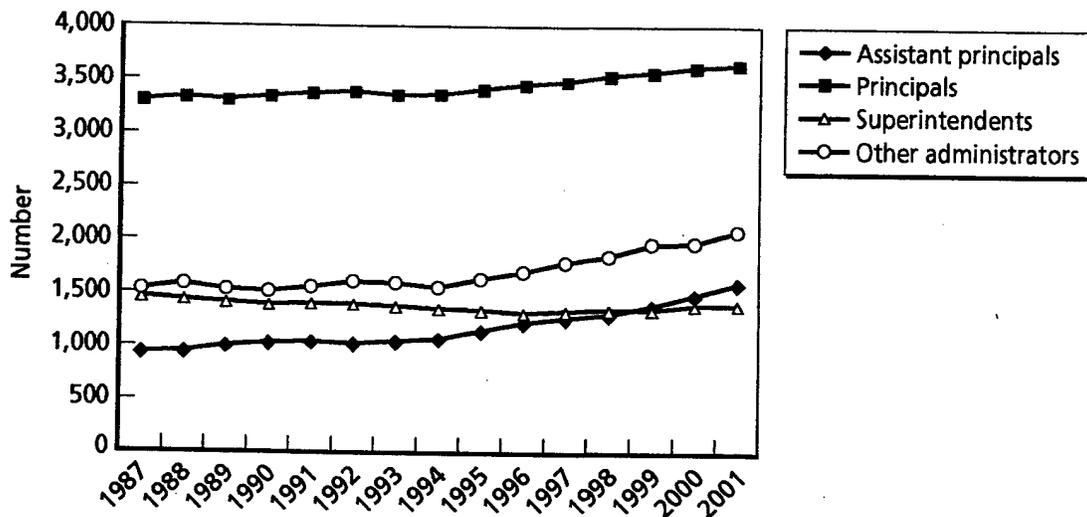
<sup>13</sup> Other administrators include deans, business managers, directors, and assistant directors.

<sup>14</sup> For this analysis, we grouped assistant, associate, and regional superintendents with school-district superintendents. We reasoned that all positions with the designation "superintendent" are high level and visible. Typically, the larger the district, the more assistant and associate superintendent positions it has.

combined insights from the descriptive and the multivariate analyses are discussed in Chapter 5.

### CHARACTERISTICS OF ILLINOIS SCHOOL ADMINISTRATORS

Figure 2.1 illustrates the trends in the number of school administrators in the state of Illinois. Between 1987 and 2001, the total number of school administrators increased by 21 percent, which is slightly lower than the 24 percent increase seen in the number of teachers during this timeframe. However, this growth was not evenly distributed across administrative positions. The number of superintendents actually declined by 5 percent, the number of school principals increased by a modest 10 percent, the number of other administrators increased by 36 percent, and the number of assistant principals increased by 71 percent. In 1987, there were 0.29 assistant principals for each principal; by 2001, that number was 0.43.



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Figure 2.1-Number of Administrators in Illinois, 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, and percentage of females and percentage of

minorities. (Tables A.1 through A.5, in Appendix A, summarize, respectively, the demographic characteristics for these five cohorts of school administrators.) The data for 1995 reveal the effects of the early retirement program that was available in 1994. Nearly 20 percent of all principals in 1995 were first-time principals, compared with 10 percent in 1990 and 2000. Also, the average age of principals, assistant principals, and other administrators, as well as the proportion over 50 and over 55, fell between 1990 and 1995. Recall that early retirement incentives were available in 1994 and 1995. This decline in the average age of principals in Illinois between 1990 and 1995 contrasts with national trends and suggests that the early retirement incentives were effective in inducing individuals to retire.

#### **THE AVERAGE AGE OF SCHOOL ADMINISTRATORS IN ILLINOIS HAS INCREASED**

In spite of the early retirement programs implemented in the mid-1990s, the age distributions of all principals and first-time principals have shifted and average ages have increased. (Figures A.1 and A.2 present the age distributions for, respectively, all principals and first-time principals in 1990 and 2000.) As was true for the nation as a whole (Gates, Ringel, and Santibañez, 2003), the proportions of all principals over age 50 and of first-time principals over age 50 increased. Compared with the state as a whole, Chicago had a much higher proportion of principals and first-time principals over age 50. By 2000, 48 percent of first-time principals and 68 percent of all principals in Chicago were over 50. We focused on the proportion of all principals over 50, as these are the individuals nearing retirement eligibility.

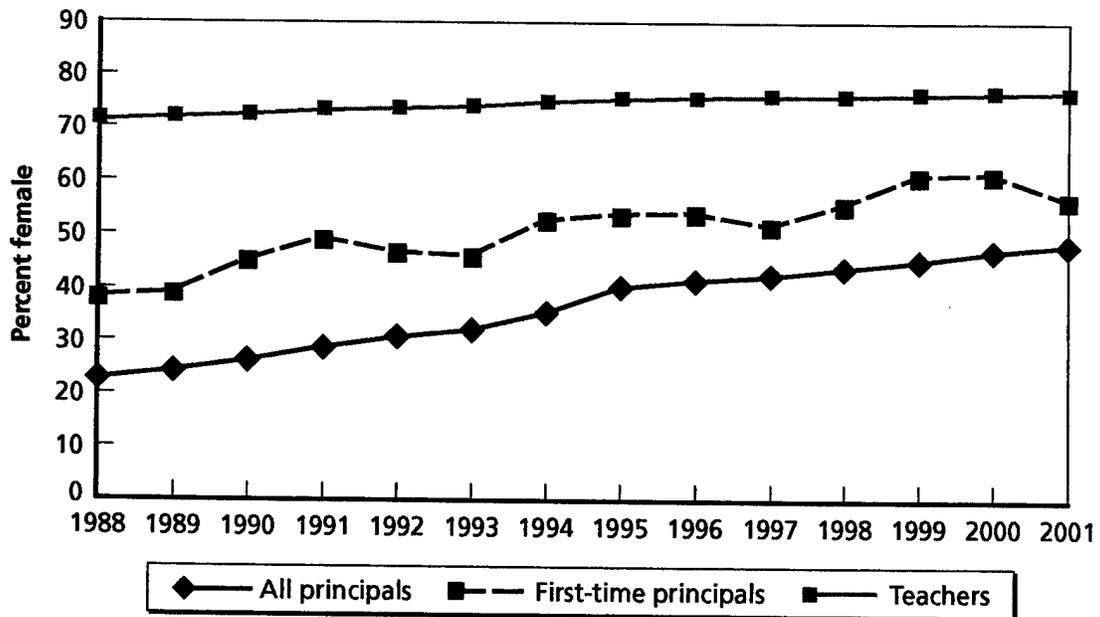
It should be noted that increases in the average age of school administrators mirror trends in the Illinois teacher workforce. Since state certification requires two years of teaching experience, teachers form a pool of potential school principals.

#### **WOMEN MAKE UP A GROWING FRACTION OF THE STATE'S SCHOOL ADMINISTRATORS**

Female representation among all categories of school administrators in Illinois grew dramatically between 1990 and 2000 (again, see Tables A.1 through A.5). Even within the superintendency, where female

representation is the lowest, 14.4 percent of superintendents in 2000 were women, compared with only 6.3 percent in 1990.

Figure 2.2 illustrates the trends for female principals. As can be seen, the proportion of female principals increased steadily between 1990 and 2000, although it still remained below the proportion of female teachers. Whereas only 26 percent of Illinois principals were female in 1990, nearly a majority—46.6 percent—were by 2000. This trend is supported by a similar increase in the proportion of new principals who were women. By 2000, a clear majority—61 percent—of first-time principals were female. This suggests that the trend in the proportion of all principals who are female should continue. The trend of increasing female representation in the principalship was evident at each grade level (see Figure A.3), although the fraction of women principals in elementary and combined grade schools was about twice as large as the fraction of women principals in the middle and high schools.



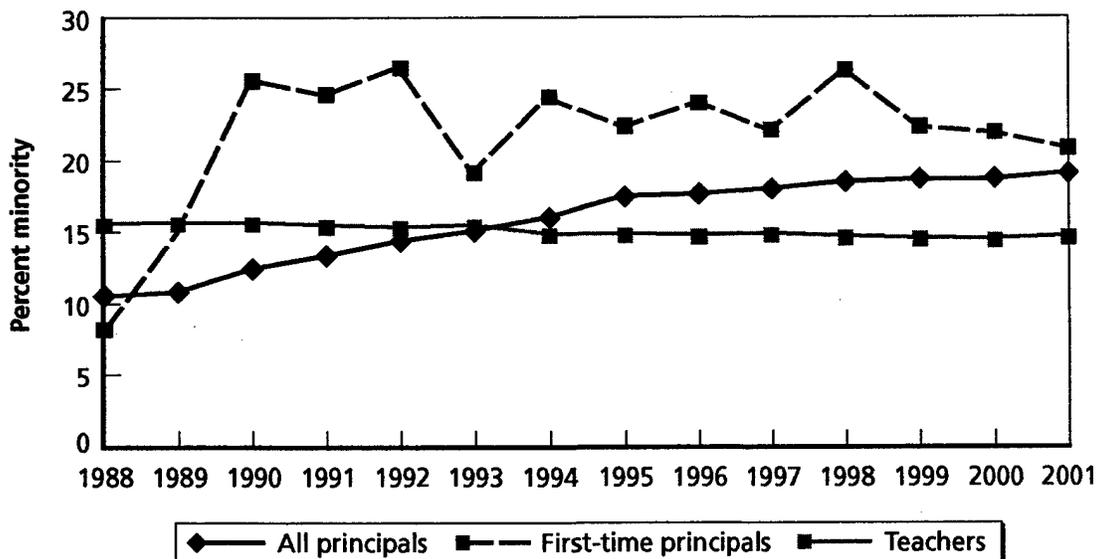
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Figure 2.2—Proportion of Illinois Educators Who Are Female

### THE PROPORTION OF MINORITY PRINCIPALS HAS INCREASED

As Figure 2.3 shows, the proportion of principals who are members of a racial or ethnic minority group has also increased over time. In 1990, only 12 percent of Illinois principals were racial or ethnic minorities; by 2000, 18 percent were. However, information on first-time principals and teachers suggests that it will be challenging for Illinois to maintain this trend. Two points are worth emphasizing here. First, the proportion of first-time principals who are minority has been relatively constant since 1994 and is now similar to the proportion of all 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 slightly over time.

Combined grade schools are much more likely than other schools to have a minority principal.<sup>15</sup> Elementary, middle, and high schools appear to be equally likely to have a minority principal (see Figure A.4).



RAND TR129-2.3

Figure 2.3—Proportion of Illinois Educators Who Are Minority

<sup>15</sup> A disproportionate number of combined grade schools are located in Chicago.

#### **THE SALARIES OF ADMINISTRATORS HAVE INCREASED STEADILY OVER TIME**

The average real annualized salary of principals and superintendents in the state of Illinois has increased steadily over time, with a higher rate of increase since 1996 (see Figure A.5). The salary paid to first-year principals generally kept pace with trends in the salary paid to veteran teachers—i.e., teachers with 20 or more years of experience. Downstate, the pay of the two groups was comparable; but in Chicago, first-time principals earned over \$5,000 per year more than veteran teachers did. The same cannot be said of the collar counties. First-year principals there earned approximately \$10,000 per year less than veteran teachers did. Both first-year principals' and veteran teachers' salaries have increased over time, but the gap has persisted. Principals in Illinois's urban and suburban schools earned over \$20,000 per year more than their counterparts in rural schools did, but there was little difference between what urban and suburban principals earned.

#### **DESCRIPTION OF CAREER PATHS INTO THE PRINCIPALSHIP**

For each individual who assumed the principalship, we examined the path he/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 other administrative positions 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. However, because we observed no clear trends across cohorts, what we discuss here are averages, pooled across all cohorts from the 1987-1988 to 1999-2000 school year.

The categories we used are mutually exclusive and reflect whether an individual held all of the positions mentioned at some point in his/her career. (See Figure A.6, which reflects career paths followed by first-time principals.) If we did not observe that an individual had held another position in the state of Illinois 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 Illinois public schools but were observed as assistant principals and then principals.<sup>16</sup> "Teacher, assistant principal, principal" was the defined path for people who had served as both teachers and assistant principals in Illinois public schools 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 who had served in an administrative capacity other than assistant principal before becoming a principal were described as "other."

"Teacher, principal" was the most common career path for Illinois principals, although we found that this path was relatively more common in Chicago and downstate than in the collar counties (see Figure A.7).

We also looked at career path by school size (see Figure A.8).<sup>17</sup> We defined small schools as those in the lowest quartile in terms of enrollment (under 226 students), medium schools as those in the two middle enrollment quartiles (226 to 576 students), and large schools as those in the top enrollment quartile (over 576 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 Illinois public schools was higher than national data would suggest. We found that 9 percent of Illinois principals were not observed as teachers prior to assuming the principalship, whereas over 99 percent of principals at the national

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<sup>16</sup> We want to emphasize here that such individuals may have indeed served as teachers at some point, either outside the Illinois public school system, or in the system but before our data set began.

<sup>17</sup> We are referring here to the school where the first-time principal works.

level had some teaching experience. This disparity may be explained by two factors. First, the principals in these categories may have obtained teaching experience outside the state of Illinois or in Illinois private schools. Second, some of the principals may have been teachers during the mid-1980s when there were gaps in the data coverage.

#### **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? Here again, we began with a large number of options and eventually collapsed them into a smaller set for ease of interpretation.

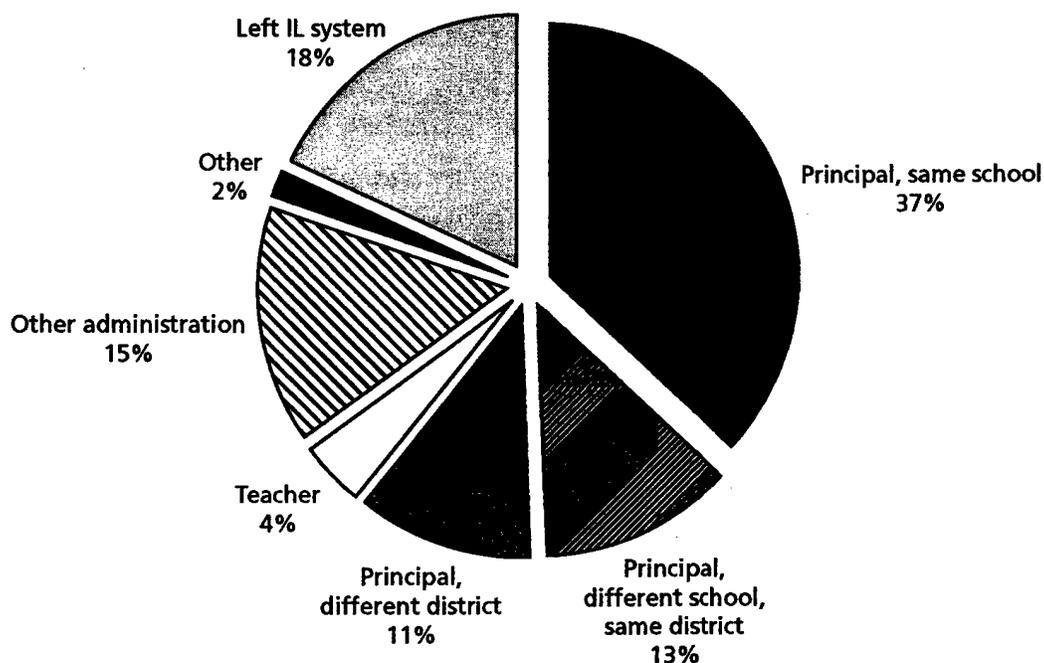
We examined information on individuals who had entered the principalship for the first time between the 1987-1988 and the 1991-1992 school year, and we considered what they were doing six years after their first year as a principal. We categorized the possibilities into nine different options: principal 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 Illinois system.<sup>18</sup>

Figure 2.4 summarizes the statewide results for first-time principals. We found that, after six years, 60 percent of our cohort of first-time principals were still principals in the state of Illinois: 38 percent remained principals in the same school, and 22 percent assumed a principalship at another Illinois school. Of those who moved, about half remained in the same district and half changed districts. A very small fraction (3 percent) of principals were teachers six years later, and 15

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<sup>18</sup> We ended up combining the two "teacher" positions and the two "other administrator" positions because we found that, statewide, those who move to teaching are likely to stay within the same district (75 percent), and those who move to another administrative position are about equally likely to stay within the same district (48 percent) as to stay within the same district (52 percent). That left us with seven categories.

percent had assumed some other administrative position. About one-fifth of the first-time principals left the Illinois system within six years.



RAND TR123-24

**Figure 2.4—Position Held Six Years After First Principalship, 1987–1993 Cohorts, Statewide**

When we looked specifically at first-time principals in Chicago alone (see Figure A.9), we found that they were less mobile than all first-time principals looked at together were. Those who did move tended to move within the district. After six years, 53 percent of first-time Chicago principals were still principals at the same school, 10 percent had moved to another school in the Chicago district, and a mere 2 percent had assumed a principalship somewhere else in Illinois.

**SUMMARY**

The average age of all teachers and school administrators in Illinois increased from 1990 to 2000, although the increase was tempered by early retirement incentives offered to Illinois public school

professionals in the mid-1990s. Those retirement incentives had a discernible effect in promoting exits from the system and reducing the average age of administrators and first-time principals. Similarly, the age distributions of all principals and of first-time principals shifted to the right and narrowed, suggesting that individuals were entering the principalship at older ages, but that retirement behaviors were not changing.

Although the proportion of female school administrators remained lower than the proportion of female teachers, female representation among school administrators increased consistently over time and across all administrative positions. Different patterns are evident for minority administrators, however. Minority representation among administrators increased more modestly over time, but the proportion of minority administrators still exceeded 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 Illinois 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 surprising degree of stability within the principalship. Contrary to press reports that schools are having a hard time retaining principals, we found that after six years, 60 percent of first-time principals were still principals somewhere in the state of Illinois, and over half of these individuals were still in the same school. Very few first-time principals returned to the classroom. There appears to have been less mobility among Chicago principals, relative to those in the rest of the state--perhaps because of the important role that local school councils play in hiring and evaluating the contracts of school principals.

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 Illinois school administrators. Specifically, we focused on two key

transitions: the transition from teaching to administration, and the turnover amongst current administrators. In exploring these transitions, we concentrated on the issues of potential interest to policymakers (see the 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 making 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-1970s to mid-1980s 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 same school, transfer to a different school, and attrition from teaching. They treated any teacher who was not teaching in the same 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 used a multinomial logistic framework to account for three different mobility decisions: stay at 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 from 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, 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's focus is precisely on understanding whether administrative opportunities influence a teacher's decision to quit.

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 examines the factors related either to an event's occurrence or to the time until the event occurs. This approach is used when there is one outcome of interest.<sup>19</sup> Another approach is the competing risks model,

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<sup>19</sup> For example, Han and Hausman (1990) examined the duration of unemployment spells, focusing on the transition from unemployment to employment.

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.<sup>20</sup>

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 transition to administration. Similarly, in the case of the transition from the principalship, an individual principal 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 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.

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<sup>20</sup> Spurr and Sueyoshi (1994) examined the promotion and quit hazards of lawyers; Ehrenberg and Mavros (1995) examined doctoral students' degree completion and dropout rates.

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 Illinois 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.

#### **MULTINOMIAL LOGIT MODELING APPROACH**

The multinomial logit model is a longitudinal event history model. Longitudinal event history analysis—a regression approach in which the occurrence of specific events of interest is causally dependent on explanatory variables (Allison, 1984)—has several key features. First, for each model there is a risk pool, consisting 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/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, 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 logit model (Allison, 1982). The multinomial logit approach also effectively addresses both of the problems of censoring and time-varying covariates, as described below.

**Table 3.1**  
**Summary of Analytical Models**

<b>Model</b>	<b>Risk Pool</b>	<b>Possible Outcomes</b>
Transition to principalship	All Illinois educators who are not principals or superintendents at time t	<ul style="list-style-type: none"> <li>• Leave system</li> <li>• Remain in system but do not become a principal</li> <li>• Become a principal</li> </ul>
Two-stage transition to principalship, stage 1	All Illinois educators who are not assistant principals, principals, or superintendents at time t	<ul style="list-style-type: none"> <li>• Leave system</li> <li>• Remain in system but do not become an assistant principal or a principal</li> <li>• Become an assistant principal</li> <li>• Become a principal</li> </ul>
Two-stage transition to principalship, stage 2	All Illinois assistant principals at time t	<ul style="list-style-type: none"> <li>• Leave system</li> <li>• Remain in system but do not become a principal</li> <li>• Become a principal</li> </ul>
Transition to superintendency	All Illinois educators who are not superintendents at time t	<ul style="list-style-type: none"> <li>• Leave system</li> <li>• Remain in system but do not become a superintendent</li> <li>• Become a superintendent</li> </ul>
Transition from principalship	All Illinois principals at time t	<ul style="list-style-type: none"> <li>• Leave system</li> <li>• Remain a principal in same school</li> <li>• Remain a principal but change schools</li> <li>• Remain in system but not as a principal</li> </ul>

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  $p(t)$ , defined as 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., age)—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  $\alpha(t)$  and time-varying explanatory variables  $x_2(t)$ ,

$$\log(p(t)/1-p(t)) = a(t) + b_1x_1 + b_2x_2(t).$$

Thus,

$$p(t) = (1 + \exp(-a(t) - b_1x_1 - b_2x_2(t)))^{-1}.$$

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

#### **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.<sup>21</sup> The explanatory variables take on their assigned 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.

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<sup>21</sup> Note that individuals were dropped from the analysis only if they never appeared in the data set again. For example, if an individual who was in the data set in 1987 was not in the data set in 1988, 1989, and 1990, and then re-appeared 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 Illinois, only 1.4 percent of our person-year observations had such gaps. We had 23,100 observations with a gap of one year or more: 58 percent were one-year gaps, 17 percent were two-year gaps, 8 percent were three-year gaps, and 16 percent were gaps of four or more years. The percentage of individuals in the sample who experienced a gap of one or more years was 9.6 percent.

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 outcome are conveniently measured at the same time in our application. Thus, this data setup and model address censoring appropriately.<sup>22</sup> 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 2 or 3 be the other categories. Then the baseline-category logits are given by

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

The baseline-category logits with predictors

$$x_1, \dots, x_5$$

has the form

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

and

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

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

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<sup>22</sup> It is also possible to build models of left censoring; however, the problem with this approach is that results are highly sensitive to the assumed censoring model. Instead, we included measures such as age or years of experience as control variables.

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).<sup>23</sup> 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

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

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  $\alpha$  and  $\beta$  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.

#### **Assumptions**

In our data set, 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

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<sup>23</sup> Most software computes confidence intervals for these odds ratios.

an independence model. Sensitivity analysis 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) assumption, 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.<sup>24</sup> 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 Illinois data, the test supports the validity of the IIA assumption in our application.<sup>25</sup> In the models, we are interested in understanding the relationship between the individual characteristics of the principal and the characteristics of the schools (or in the case of the superintendent model, the districts) in which they are working and 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,

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<sup>24</sup> <http://www.stata.com>.

<sup>25</sup> 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.

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 an interesting 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 into the model. The comparison of the estimates between the two specifications provided some information on the magnitude of the endogeneity and omitted variable 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.

All analyses were clustered at the school level. Clustering an analysis does not alter the estimated coefficients, but, rather, adjusts the standard errors of the estimates. This adjustment is done to account for the possibility that there are unobserved factors common to people in the same school. If such a common factor exists, then the error terms for each person working in the same school would be correlated and thus violate the standard assumption of independent errors across all observations. Clustering at the school level accounts for this correlation and produces the correct standard errors. In general, accounting for clustering produces standard errors that are larger than those estimated under the assumption of independent errors (i.e., after clustering, the significance of the estimates tends to go down).

#### **Explanatory Variables**

We used the following explanatory variables in the model.

To measure education, we included indicators for having a master's degree and having a Ph.D. The omitted category is individuals with a bachelor's degree as the highest degree obtained.<sup>26</sup>

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<sup>26</sup> Observant readers may be curious as to why we included degree dummy variables in the model when Illinois requires a master's degree for administrative certification. Empirically, there are a nontrivial number of exceptions to that rule. Schools and districts are able to use

Experience was measured as the number of years the person has been in the Illinois public school system. We entered both the actual number of years and the squared deviation from the average experience of the sample. We included an indicator for gender in the model in addition to interactions between the female indicator and age, year, and school level (only in specification 2).<sup>27</sup> The measures of minority status included were indicators for race/ethnicity (i.e., African-American and Hispanic, with white as the reference group) and an interaction between the indicator for African-American and year.

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. It should be noted that for the Illinois data, we know the person's undergraduate institution only if it is in Illinois. Therefore, all people (25 percent of the sample) who obtained degrees at colleges outside Illinois are necessarily lumped into the reference category. The reference category thus includes individuals who hold a degree from another state or from an Illinois institution in the middle of the rankings.

The Illinois public school system differs substantially across regions in terms of demographics, urbanicity, and such school

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a waiver process to hire individuals who do not meet the criteria. Often, these individuals are pursuing the degree/credential while in their new administrative position. This pattern would be most likely in schools or districts that make use of "tapping" practices--i.e., that identify promising administrative candidates prior to their enrolling in a certification program and then support them through the program. Thus, in the analysis of career transitions, it is in fact necessary to include individuals who have not met these "requirements."

<sup>27</sup> We considered interaction terms where we had some hypothesis that there might be differences between men and women. We interacted gender and year, gender and school level, gender and age, and gender and race/ethnicity. We ran into estimation problems with some of the interactions because of small cell sizes (e.g., interaction with race/ethnicity). We retained in the model only those interactions that were estimable and significant for the sake of clarity.

characteristics as size. Moreover, the regions are generally thought of as separate labor markets. We therefore felt it was important to control for region of the state in our analyses. We also wanted to control for the urbanicity of the area in which the person worked. Because there is a great deal of overlap between region and urbanicity, we chose to combine the two measures. The three regions are Chicago, the collar counties (the suburban areas of Cook County and other suburban counties bordering Chicago), and downstate (the rest of Illinois). The three categories of urbanicity are urban, suburban, and rural. We combined these two measures to create a categorical variable with five values: Chicago-urban, Chicago-suburban, Other-urban, Other-suburban, and Rural.

School and district characteristics were obtained by merging CCD data with the state data. These characteristics are summarized in Table 3.2.

#### **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 analyses, 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 ( $e^{\beta_j 1}$ ) 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  $j$  ( $\Pi_j / \Pi_1$ ) 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.

**Table 3.2**  
**Independent Variables Included in Regression Analyses**

<b>Model</b>	<b>Individual Characteristics</b>	<b>Interaction Terms</b>	<b>School or District Characteristics</b>	<b>Interaction Terms</b>
Single-stage model of transition to principalship	Age, centered age squared, gender, quality of undergrad institution, education, experience in IL, centered experience squared, region/urbanicity, year indicators	Year 1994 x age, year 1995 x age, and African-American x all year indicators	School size, percentage of student body that is nonwhite, indicator for principal being same race/ethnicity as plurality of students, school level	Gender x school level
Two-stage model of transition to principalship	Age, centered age squared, gender, quality of undergrad institution, education, experience in IL, centered experience squared, region/urbanicity, year indicators	Year 1994 x age, year 1995 x age	School size, percentage of student body that is nonwhite, indicator for principal being same race/ethnicity as plurality of students, school level	Gender x school level
Principal turnover	Age, centered age squared, gender, quality of undergrad institution, education, experience in IL, centered experience squared, region/urbanicity, year indicators	Year 1994 x age, year 1995 x age, and African-American x all year indicators	School size, percentage of student body that is nonwhite, indicator for principal being same race/ethnicity as plurality of students, school level	Gender x school level
Transition to superintendency	Age, centered age squared, gender, quality of undergrad institution, education, experience in IL, centered experience squared, region/urbanicity, year indicators	Year 1994 x age, year 1995 x age	District size	Gender x school level

Unfortunately, these parameter estimates and odds ratios do not allow for an intuitive interpretation of the results. Even though we can say with confidence that a parameter estimate is statistically significantly different from zero, the magnitude of the coefficient does not provide much intuition for interpreting 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.<sup>28</sup>

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 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<sup>29</sup> and calculates the predicted probabilities

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<sup>28</sup> 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.

<sup>29</sup> 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.

while holding all other values for the independent variables fixed at their sample means.<sup>30</sup> 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 in 1987; these variables were then allowed to increase each year. The year dummies were turned on and off to reflect the appropriate year.

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<sup>30</sup> 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 alternative 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.

#### 4. SUMMARY OF RESULTS FROM THE MODELS FOR ILLINOIS

We now turn to summarizing the results of the four models described in Chapter 3. As we do so, we focus on the fully interacted 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.

##### **ANALYSIS OF TRANSITION TO THE PRINCIPALSHIP**

Our analysis sought to identify individual- and school-level factors that affect the probability of a teacher in the Illinois public schools (a) making a transition to the principalship and/or (b) leaving the Illinois public school system. To do this, 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 principal, and become a principal. The analysis sample included all people who began as teachers in the Illinois 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 next sections summarize the relationship between the explanatory variables of interest and the outcome possibilities. (See Table B.1, in Appendix B, for summary statistics for the dependent and independent variables; and see Table B.2 for the results of the model estimation.)

##### **Education/Experience**

We found no effect of education on the probability of dropping out of the system. In contrast, individuals with a master's degree or a

Ph.D. had a higher likelihood of becoming a principal than did those without such degrees. This result is not surprising given that a master's degree is a stated requirement for becoming a principal in Illinois (though we did observe a nontrivial number of principals in the data without a master's, as discussed in Chapter 3).

For the probability of dropping out, we found a negative coefficient on the linear term and a positive coefficient on the quadratic term. This reflects an overall trend for individuals to be less likely to drop out of the system as they gain more experience in the system, combined with a relationship suggesting that people are more likely to drop out as their experience diverges from the population's average experience. In other words, individuals with the least experience are most likely to drop out; and the probability of dropping out declines until those individuals reach some critical experience level (above the average experience level of the population), at which point the probability begins to increase with experience. The increase in the probability of dropping out that occurs at later ages likely reflects retirement decisions.

We found the opposite relationship for the probability of becoming a principal: positive parameter estimate on the linear term and negative parameter estimate on the quadratic term. Overall, individuals are more likely to become principals as they gain experience. Once the individuals become much more experienced than the average population, however, these relations may be reversed. This suggests that teachers are most likely to transition to the principalship when they are near the average experience level of the population as a whole.

#### **Gender**

Based on the main effect (i.e., not considering the interaction terms), females are more likely than males to drop out of the school system and are less likely than males to become principals.

The interaction terms suggest that for females, the positive effect of age on the probability of leaving the system is somewhat smaller than it is for men. Similarly, the negative effect of age on the probability

of becoming a principal is smaller for females.<sup>31</sup> Finally, in the specification including school characteristics, we found that the negative effect that being in a high school relative to an elementary school has on the probability of becoming a principal is reduced for women relative to men, and that being in a middle school appears to have a positive effect on the probability of becoming a principal for women, but not for men.

To understand the full effect of being female (i.e., accounting for both the main and interaction effects), we estimated the probabilities of dropping out and making the transition to the principalship for men and women separately. We found that while men and women are equally likely to drop out of the system, men are more than 2.5 times more likely to become a principal than women are.

#### **Race/Ethnicity**

Based on the main effects of race/ethnicity, African-Americans and Hispanics are less likely than whites to leave the school system. Interestingly, Hispanics are more likely than whites to become principals, but there is no difference in the probability of becoming a principal for African-Americans and whites. However, when we considered the full effect of being African-American on the probability of becoming a principal (i.e., accounting for both the main and interaction effects), we found African-Americans to be twice as likely as whites to become principals. When we focused on the interaction terms, we found that African-Americans were more likely than whites to leave the system from 1995 onward. However, we found no discernible pattern in the interaction terms on the probability of becoming a principal.

#### **Quality of Undergraduate Institution**

The results indicate that coming from a highly competitive college increases the likelihood of leaving the Illinois public school system,

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<sup>31</sup> At first look, it may seem odd that there is a negative relationship between age and the probability of becoming a principal. However, the models also include controls for years of experience in the Illinois school system. Thus, the coefficient on age represents the relationship between age and the probability of becoming a principal, holding years of experience constant.

and coming from a noncompetitive college decreases that likelihood. Moreover, coming from a noncompetitive school increases the likelihood of making the transition to the principalship. It is worth noting that a small fraction of the sample population (approximately 6 percent) attended a highly competitive college.

#### **Region/Urbanicity**

The results show that in terms of the likelihood of teachers leaving the public school system, those in the urban areas of Chicago are the least likely, those in the rural areas of Illinois are the second least likely, and those in all the other areas of Illinois are the third least likely. And across all areas, teachers in the rural areas are most likely to make the transition to the principalship.

#### **School Characteristics**

A school's characteristics appear to play an important role in teacher transition both out of the system and into the principalship. The results suggest that school size is negatively related to the probability of leaving the system and becoming a principal. That is, teachers in larger schools are less likely than those in smaller schools to leave and are less likely to become principals.

The racial makeup of the student body is also an important predictor. We found that the percentage of the student body that is minority is positively related to the probability of teachers' leaving and the probability of their transitioning to the principalship. The results also suggest that the level of school at which a person works is important. Teachers in high schools and combined schools are more likely than those in elementary schools to leave the system. At the same time, teachers in combined schools are more likely than those in elementary schools to become principals, but there is no difference for teachers in either middle or high school relative to teachers in elementary school.

#### **ILLINOIS 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 that affect the probability of becoming a principal. This analysis differs 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 are 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. The sample for this model included all people who began as teachers in the Illinois 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.)

#### **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 are quite similar to those found for the previous model.

**Education/Experience.** As would be expected, we found that individuals with a master's or Ph.D. have a higher probability of becoming an assistant principal than do individuals without such degrees.

We found a positive coefficient on the linear experience term and a negative coefficient on the quadratic experience term for the probability of becoming an assistant principal. This pattern indicates that individuals are more likely to become assistant principals as they gain experience. Once they become much more experienced than the average population, this relationship may be reversed, however. This suggests

that, as with the transition to the principalship (see above), individuals are most likely to make the transition to the assistant principalship when they are near the average experience level of the population as a whole.

**Gender.** Based on the main effect, female teachers are less likely than male teachers to become assistant principals.

The interaction terms indicate that the negative effect of age on the probability of becoming a principal is somewhat smaller for women than for men. When we added school characteristics into the model, we found that for women, being in a middle school or high school, relative to an elementary school, has a positive effect on the probability of becoming an assistant principal.

When we compared the predicted probability of making the transition to the assistant principalship for males and females, we found that male teachers are approximately 2.5 times more likely than female teachers to make the transition.

**Race/Ethnicity.** Based on the main effects, both African-Americans and Hispanics are more likely than whites to become assistant principals. We saw no pattern in the interaction terms for African-Americans by year.

**Quality of Undergraduate Institution.** As noted earlier, we used indicator variables based on the Barron's ranking of undergraduate institutions as a proxy for individual ability. These variables provided some evidence that teachers who attend noncompetitive colleges are more likely than teachers in the omitted category (i.e., those who attend middle-ranked colleges) to become assistant principals. However, this effect disappears once school characteristics are included in the model. In our preferred specification (i.e., the model includes both individual and school characteristics), the quality of the undergraduate institution had no effect on the probability of becoming an assistant principal.

**Region/Urbanicity.** We found that teachers in Chicago's urban and suburban areas and in other urban areas of the state are more likely than teachers in the rural areas of Illinois to become assistant principals. Although we controlled for some school characteristics, such as size, this result may reflect other differences between the regions

(e.g., there are fewer schools with assistant principal positions in rural areas than there are in other areas of the state). There was no statistical difference between the probability that a person in a suburban area outside Chicago would transition to an assistant principalship and the probability that a person in a rural area would.

**School Characteristics.** As we saw for principals in the basic three-outcome model, school characteristics appear to play an important role in predicting transitions. We found that school size is negatively related to the probability of becoming an assistant principal—that is, teachers in larger schools are less likely than those in smaller schools to become assistant principals. In addition, there is a positive effect associated with being in a school with a higher percentage of nonwhite students. Finally, school level is a significant predictor, with teachers in middle schools being more likely than those in elementary schools to become assistant principals. Interestingly, teachers in high schools are less likely than those in elementary schools to make the transition.

#### **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.

**Education/Experience.** We found that education has no effect on the probability of leaving the system. However, we also found that assistant principals with a master's or Ph.D. have a higher probability of becoming a principal than assistant principals without such degrees do.

Additionally, we found that experience in the state public school system is a strong predictor of making this transition. For the probability of leaving the system, we found a negative coefficient on the linear term and a positive coefficient on the quadratic term. This pattern on the experience coefficients suggests that the probability of an assistant principal leaving the system falls as he/she gains experience. However, at some point, the added experience tends to increase the probability of leaving. Again, this result is consistent with an increased probability of retirement among older, more

experienced individuals. For the probability of becoming a principal, we found negative coefficients on both the linear and quadratic terms, suggesting that assistant principals with more experience and with experience levels that deviate more from the average experience level are less likely to become principals.

**Gender.** When we looked only at the main effect, we found that female assistant principals are, compared to male assistant principals, more likely to leave the system and less likely to become principals. However, when we considered both the main and the interaction effects and compared the predicted probability of becoming a principal for men and for women, we found that women assistant principals are slightly (1.2 times) more likely than men to become principals.

The interaction terms suggest that the positive effect of age on the probability of leaving the system is reduced for women relative to men. Similarly, the negative effect of age on the probability of becoming a principal is smaller for women than it is for men. We also found that in models that included school characteristics, the negative effect of being in a middle school relative to an elementary school on the probability of becoming a principal was smaller for women. However, the negative effect of being in a high school was larger for women than for men.

**Race/Ethnicity.** We found no effect of race/ethnicity on the probability of leaving the school system in this stage of the model. However, we did find that African-Americans are more likely than whites to become principals.

**Quality of Undergraduate Institution.** The quality of the undergraduate institution attended by an assistant principal does not appear to impact the probability of leaving the system in this model. In contrast, we found that having a degree from a noncompetitive school increases the probability of becoming a principal.

**Region/Urbanicity.** Assistant principals in the urban areas of Chicago are less likely than those in the state's rural areas to leave the public education system. There is no difference in the probability of leaving, however, for assistant principals in the rural areas and assistant principals in other areas of the state (i.e., the suburban areas of Chicago, other urban areas, and other suburban areas). The

pattern of regional/urbanicity differences in the probability of becoming a principal that we saw for the full sample was also seen for the assistant principals: People in rural areas are the most likely to become principals, although the difference between those in urban areas outside of Chicago and those in rural areas is not statistically significant.

**School Characteristics.** In contrast to the other models, school characteristics in this model are not significant predictors of the probability of leaving the system. The probability of becoming a principal, however, is affected positively by the percentage of nonwhite students in the school. The only school characteristics that are significantly negatively related to the probability of becoming a principal are school size and being in a high school relative to an elementary school.

#### **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 a transition to the superintendency and/or leaving the Illinois 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 analysis sample included all people who began as teachers in the Illinois public school system, were not currently in a superintendent position, and worked in the system between school years 1987-1988 and 1999-2000. (Table B.5 provides summary statistics for the dependent and independent variables; Table B.6 presents the results of the model estimation.)

#### **Education/Experience**

The results show that having a Ph.D. does not affect the probability of leaving the system, but that individuals with a master's degree are less likely than individuals without an advanced degree to leave the system. People with a master's or Ph.D. have an increased probability of becoming a superintendent relative to people without such degrees.

The effects of experience are similar to those in the model of transition to the principalship. Specifically, for the probability of leaving the state system, we found a negative coefficient on the linear term and a positive coefficient on the quadratic term. Again, this pattern indicates that the probability of leaving declines with experience up to some point, at which the relationship reverses. For the probability of becoming a superintendent, we found a positive coefficient on the linear term and a negative coefficient on the quadratic term, indicating that the probability of becoming a superintendent increases with experience up to some point, after which additional years of experience are associated with a decreased probability of transition.

#### **Gender**

When we looked only at the main effect of being female, we found that women are more likely to leave the system and less likely to become superintendents than males are. When the full effect of being female is considered (i.e., the predicted probabilities of transition for males and females are compared), the results support the finding that women are less likely to become superintendents. In fact, the results are quite striking: Men are 4.5 times more likely than women to become superintendents.

A focus on the interaction terms shows that being female reduces the effect of age on both the probability of leaving and the probability of becoming a superintendent.

#### **Race/Ethnicity**

As we saw for the other models, African-Americans and Hispanics are less likely than whites to leave the system. We also found that the probability of becoming a superintendent is higher for African-Americans than for whites, but only in the specification including district characteristics.

#### **Quality of Undergraduate Institutions**

This proxy for individual ability indicates that people with degrees from noncompetitive colleges are less likely to leave the system than others are, and that people with degrees from highly competitive

schools are more likely to leave the system than others are. Interestingly, the undergraduate institution's level of competitiveness has no significant effect on an individual's likelihood of becoming a superintendent.

#### **Region/Urbanicity**

With the full sample, we found that the probability of leaving the public education system is lower for principals in the urban areas of Chicago than it is for principals in rural areas of the state. At the same time, people in both the suburban areas of Chicago and the urban areas outside of Chicago are more likely than people in rural areas to leave the system. Holding all else constant, we found that teachers in the rural areas are the most likely to make the transition to a superintendent position.

#### **District Size**

The only district characteristic included in the model was district size. We found that district size is positively related to the likelihood of leaving the system and negatively related to the probability of becoming a superintendent.

#### **MODEL OF PRINCIPAL MOBILITY AND ATTRITION**

In this analysis, we wanted to identify individual- and school-level factors that affect the probability of 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 Illinois public school system. To do this, we used a discrete time competing risk 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 (for simplicity, we call this "changing schools"), and remain in the system but not as a principal (for simplicity, we call this "changing positions"). The analysis sample included all people who began as teachers in the Illinois public school system, were currently in a principal position, and worked in the system between school years 1987-1988 and 1999-2000. (Table B.7 provides summary statistics for the

dependent and independent variables; Table B.8 presents the results of the model estimation.)

#### **Education/Experience**

Education was found to have no effect on the probability of leaving the system or of changing schools. We did, however, find that principals with a master's degree are less likely than principals without an advanced degree to change positions within the state system.

Experience was found to be a significant predictor for all transitions. For the probability of leaving the state system, the linear term was found to be insignificant and the quadratic term positive. For the probability of changing schools or changing positions, we found the coefficients on both the linear and the quadratic terms to be negative. This pattern suggests that the probability of changing schools or positions decreases as experience increases and decreases more rapidly as a principal's experience level deviates from the average level in the sample.

#### **Gender**

The coefficient on the female indicator suggests that women are more likely than men to leave the system and to change positions. There is no main effect of being female on the probability of changing schools.

The interactions indicate that the positive effect of age on the probability of leaving the system is reduced for females. We also found that age has a negative effect on the probability of changing positions for females but appears to have no effect for males.

#### **Race/Ethnicity**

In this model, race/ethnicity had little effect on the probability of leaving the system. In contrast, being Hispanic had a strong positive effect on the probability of changing schools and changing positions. The interaction terms between African-American and year showed a strong positive effect in 1995 for all outcomes.

#### **Quality of Undergraduate Institution**

The quality of the undergraduate institution was found to have no significant effect on any of the possible outcomes in this model.

#### **Region/Urbanicity**

As was the case for all of the other models, we found that people (in this case, principals) in the urban areas of Chicago are less likely than people in rural areas of the state to leave the system. However, we found no statistical difference in the probability of leaving for people in rural areas versus those in other areas of the state. The probability of changing schools is higher for principals in the urban areas of Chicago and lower for principals in the suburban areas of Chicago relative to principals in rural areas of the state. We found no statistical difference in the probability of changing schools for people in rural areas versus those in other areas of the state. The probability of changing positions, however, is higher for principals in rural areas than it is for principals in the urban or suburban areas of Chicago, and is the same as it is for principals in the other areas of the state.

#### **School Characteristics**

As we saw in the other models, school characteristics appear to play an important role in predicting transitions. The racial/ethnic makeup of the student body is a significant predictor of all of the outcomes. The percentage of the student body that is nonwhite is positively related to the probability both of changing schools and of changing positions. In addition, the indicator for the principal being of the same race/ethnicity as the plurality of students is negatively related with the probability both of leaving the system and of changing schools. School size is also important; it is negatively related to the probability of each of the outcomes. Finally, school level has some effect in that principals in middle schools, high schools, and combined schools are more likely than principals in elementary schools to change positions.

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## 5. DISCUSSION AND CONCLUSIONS

Taken together, the descriptive analysis and multinomial logit models of administrative careers raise some interesting issues of potential interest to policymakers. Those issues are discussed here, along with the conclusions we reached based on our analyses.

### **DESCRIPTIVE OVERVIEW SUGGESTS MODEST GROWTH AND DEMOGRAPHIC SHIFTS IN THE POPULATION OF ILLINOIS SCHOOL ADMINISTRATORS**

The findings of our descriptive overview of Illinois 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 and North Carolina (Lankford, O'Connell, and Wykoff, 2003; Gates et al., 2004). The average age of all teachers and school administrators in Illinois increased over the last decade, although the increase was tempered by early retirement incentives offered to public school professionals in Illinois in the mid-1990s. 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 Illinois is still lower than the proportion of teachers who are women, 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 findings in New York and North Carolina. In the 1999-2000 school year, 76 percent of Illinois teachers were female, compared with 47 percent of all school principals, 61 percent of first-time principals, 49 percent of assistant principals, 42 percent of other administrators, and 14 percent of superintendents. Ten years earlier, in the 1989-1990 school year, only 7 percent of superintendents and 26 percent of all principals were female.

Different patterns are evident with respect to minority administrators (that is, those who are members of racial/ethnic groups). In the 1999-2000 school year, minorities made up a total of about 41

percent of the entire student population of Illinois. In contrast, minorities made up only 15 percent of the teaching force, 19 percent of all principals, and 4 percent of all superintendents.<sup>32</sup> The proportion of administrators who are members of racial/ethnic groups increased modestly over time for each category of administrator. Similar trends were observed in North Carolina.

Our analysis of the subsequent career choices made by first-time principals suggests a surprising degree of stability within the principalship. Contrary to press reports indicating that schools are having a hard time retaining principals, we found that after six years, 60 percent of first-time principals were still principals somewhere in the state of Illinois, and over half of them had remained in the same school. Very few first-time principals returned to the classroom. There appears to be less mobility among Chicago principals relative to the rest of the state, perhaps because of the important role local school councils (LSCs) play in hiring school principals and evaluating their contracts. This portrait of stability contrasts somewhat with the findings from North Carolina, where only 18 percent of new principals remained in the same school, 8 percent moved to another district, 22 percent moved to another school in the same district, and 26 percent left the system (Gates et al., 2004).

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 Figure 1.1, in Chapter 1). Based on their examination of data on the number of school principals, Gates, Ringel, and Santibañez (2003) concluded that growth in the number of school administrators has been relatively modest. Our Illinois data revealed something different: While the number of school principals and superintendents has increased modestly or even decreased, the total number of school administrators has indeed increased over time, due to substantial increases in the number of other administrators and

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<sup>32</sup> In the 1999-2000 school year, 24 percent of students enrolled in education programs (other than educational administration) and 29 percent of students enrolled in educational administration programs in Illinois were minority (Illinois Board of Higher Education, n.d.).

assistant principals. Similar trends were observed in North Carolina. This suggests that schools and districts are increasingly assigning 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 Illinois 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. Similarly, an increase in the number of people entering the principalship that have not been observed as teachers in the Illinois public school system might suggest that schools are tapping the private sector or out-of-state markets to alleviate shortages.

Our analyses reveal no time trend in terms of the probability that individuals in Illinois transition from teaching to the principalship. A survey of those obtaining administrative (T75) certificates in Illinois in 1999-2000 (DeAngelis, 2003) supports the notion that there is no supply crisis. In 1999-2000, approximately 1,400 individuals received the T75 certification. Of these, seven out of ten had applied for an administrative position, but only four of ten were actually working as administrators. Similarly, when we examined the characteristics of

cohorts of first-time principals, we observed no time trend in the proportion of individuals entering the principalship without first serving as teachers in the state of Illinois.

It is important to emphasize that schools and districts are relatively flat organizations, and that most teachers remain in the classroom throughout their careers. In the 1999-2000 school year, teachers represented approximately 85 percent of the professional staff in Illinois public schools and districts, whereas other administrators represented approximately 10 percent, principals made up just over 2 percent of the total, and assistant principals and superintendents were at 1 percent each. Clearly, schools and districts neither want nor need a large proportion of teachers to transition to administrative positions. It is extremely unlikely that an educator will become a principal in any given year.

When we use the estimates from the model of transition to the principalship to calculate average probabilities, we find that an educator who is not a principal has a 4 percent chance of leaving the school system in a given year and a probability of 0.1 percent of becoming a principal. We ran a simulation to calculate the combined probability that an educator who was 40 years old in 1988 had become a principal by 2000. That total combined probability was 1.8 percent, compared with a probability of 28 percent that he/she had dropped out of the system.

#### **The Gender Gap Is Alive and Well**

Public sector organizations often place value on the racial 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 in gender representation that we found (see description above), our analysis also revealed that across the board, females are less likely to advance to administrative positions. When we controlled for other characteristics, we found that men were three times more likely than women to become principals over

the 1987-2000 period, and there was no evidence that the rate of transition grew more favorable for women over that period. In accounting for the possibility of becoming an assistant principal, we found that men are nearly 2.5 times more likely than women to become principals directly (without serving as an assistant principal), and over 2.5 times more likely to become assistant principals. However, conditional on having become an assistant principal, women are nearly 20 percent more likely to become principals. These findings for Illinois are similar to those for North Carolina, where men were found to be four times more likely than women to become assistant principals, but female assistant principals were found to be equally as likely as men to become principals. In New York, Lankford, O'Connell, and Wyckoff (2003) found that men are 30 percent more likely than women 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 the strongest at the point where individuals make the initial transition to administration.

Our analysis also suggests that the gender gap is not a characteristic specific to high schools. We found that in Illinois's public schools in 1999-2000, women represented over 50 percent of the principals in both elementary schools and combined schools, but only 26 percent of the principals in high schools and 31 percent in middle schools. However, of these women, it was those in the middle and high schools that we found to be more likely to become principals or assistant principals. In other words, the gender difference in the teaching pool at the elementary and the high school levels is driving the differences in representation in school administration.

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/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 both. In other words, gender differences in career preferences and gender discrimination are both plausible explanations for the finding, and we have no evidence that favors 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, 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 provide no evidence that African-Americans are either more or less likely than whites to become principals in the Illinois public school system. We did find, however, that Hispanics in Illinois are more likely than whites to become principals. We also found some evidence of differences in career paths. For example, African-Americans and Hispanics are more likely than whites to become assistant principals, and African-American assistant principals are more likely than their white counterparts to become principals. Since African-Americans are more likely than whites to become assistant principals and yet are equally as likely as whites to become principals directly, it may be that African-Americans are more likely than whites to follow the structured, incremental path of teacher to assistant principal to principal.

In a survey of individuals receiving administrative certification in 1999-2000, DeAngelis (2003) found that a larger percentage of African-American respondents applied for administrative jobs (81 percent, versus 70 percent for whites), but that a smaller proportion of them landed those jobs (22 percent, versus 44 percent for whites). The

survey also shows that 19 percent of white administrators had obtained their positions without applying, whereas no African-American candidates did. The DeAngelis report does not explore whether this finding stems from urban/rural differences, which may have been in play: Nearly 24 percent of the certificants responded that they pursued administrative certification because of the convenience of the program, and convenience may pose a special barrier for rural teachers in Illinois.

One potentially alarming finding of this study is that since 1995, African-American teachers in the Illinois public school system have been more likely to leave the system. 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 might be 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.

#### **Illinois Public Schools Are Less Likely to Retain and Promote Educators Who Graduate from Highly Competitive Colleges**

As we mentioned throughout the report, our analysis suffered from a lack of information on the quality of school administrators. We chose to use the ranking of the undergraduate institution an individual attends as a measure of school administrator quality.

We found that individuals who attend a highly competitive college are much more likely to leave the education system, whereas those who attend a noncompetitive school are not only less likely to leave the system but more likely to transition to the principalship. This suggests that the Illinois public school system may be retaining and promoting those with the most limited outside opportunities. At a minimum, 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.

#### **RATES OF TURNOVER AMONG PRINCIPALS IN ILLINOIS VARY BY SCHOOL CHARACTERISTICS**

The descriptive analysis revealed a substantial degree of stability among Illinois public school principals. The multivariate analysis

confirmed this finding, but it suggests that schools with certain characteristics have lower levels of administrative stability. Overall, over the 1987-2001 timeframe, turnover among school principals in Illinois was 14 percent. In contrast, turnover among school principals in North Carolina was higher, at 18 percent (Gates et al., 2004). We found that only about 20 percent of this turnover was due to principals leaving the Illinois system. Specifically, among the pool of principals in a given year, we found that in the next year, 86 percent were still principals in the same school, 7 percent had become principals in a different school, 4 percent remained in the Illinois school system but not as principals (for example, they might have returned to teaching or have taken another administrative position), and only 3 percent had left the system.

Our analysis of principal mobility and turnover revealed some interesting variation by school characteristics. Principals in large schools in the Illinois public school system are less likely than those in smaller schools to assume a principalship in another school or leave the principalship to assume another position in the system. Principals of large schools are also less likely to leave the system. This suggests that larger schools are not facing particular challenges in retaining principals. Gates, Ringel, and Santibañez (2003) found that larger schools tend to have more problems than smaller schools do, but that principals of larger schools are paid more. The findings of the current analysis suggest that the salary differential may be enough to keep the principals in place.

Another of our findings is that principals in schools with a larger proportion of minority students are 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. Interestingly, we 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 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.

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 Illinois public school system is quite low. A study by Burgess, Lane, and Stevens (2001) found that more than 75 percent of employers have turnover, or churning, rates 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, 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 their 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 of administrators 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 TO 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 educator 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) argues 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 some 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 to better understand the characteristics of individual educators 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. Some work has been done on the importance of leadership, although not for school leadership in particular. In a summary of public sector leadership theory, Van Wart (2003) concludes that most of the research in this area has emphasized 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's assessment and call to action can be easily 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, and 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 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.<sup>33</sup>

The efforts just described adopt the perspective that there is a single set of characteristics for all good school administrators. Portin et al. (2003) identify key leadership functions that must be performed within a school, but also note 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) places 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 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 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

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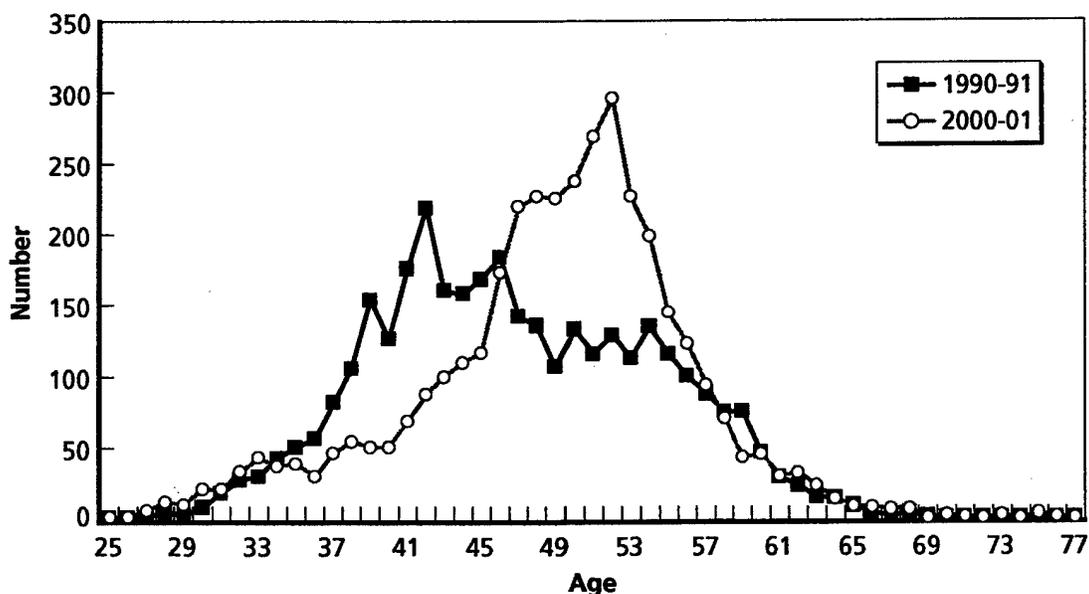
<sup>33</sup> [http://www.ccl.org/CCLCommerce/assessments/overview.aspx?CatalogID=Assessments&CategoryID=Overview\(Overview\)](http://www.ccl.org/CCLCommerce/assessments/overview.aspx?CatalogID=Assessments&CategoryID=Overview(Overview)); <http://www.gallup.com/content/default.asp?ci=1435>.

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 (NCLB) 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 signifying poor principal leadership skills, is problematic in that it defines high turnover as a negative. After all, high teacher turnover can just as readily be interpreted as a positive if one assumes that a principal with good leadership skills 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.

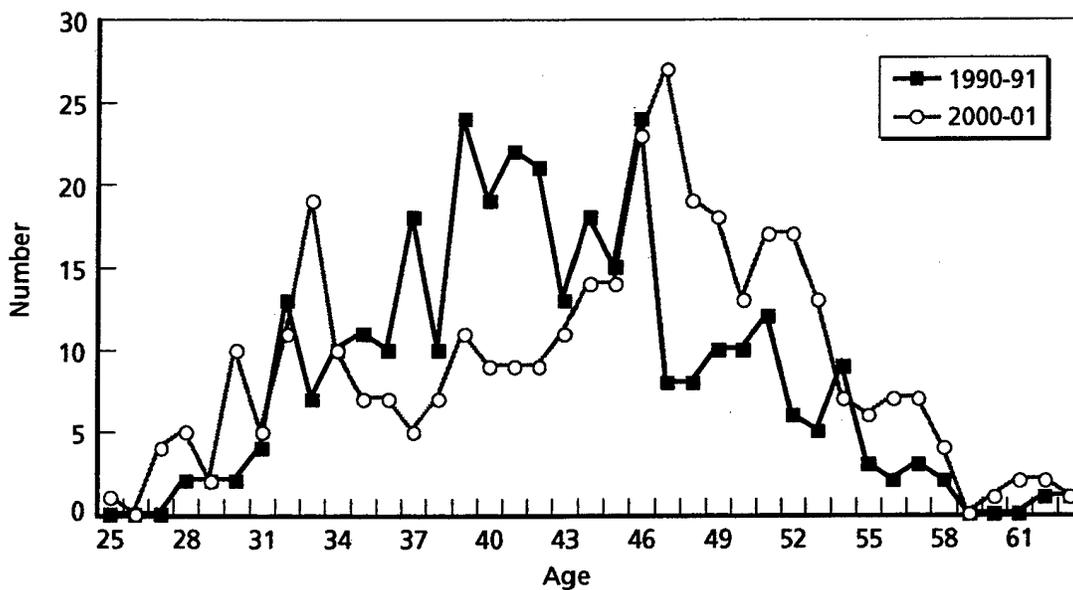
**APPENDIX A: ADDITIONAL DESCRIPTIVE ANALYSIS FIGURES AND TABLES**

In this appendix, we present nine additional figures and five tables that, together with the figures in Chapter 2, provide a detailed descriptive overview of Illinois school administrators and their careers. This information is the basis for many of the findings discussed in Chapter 2.



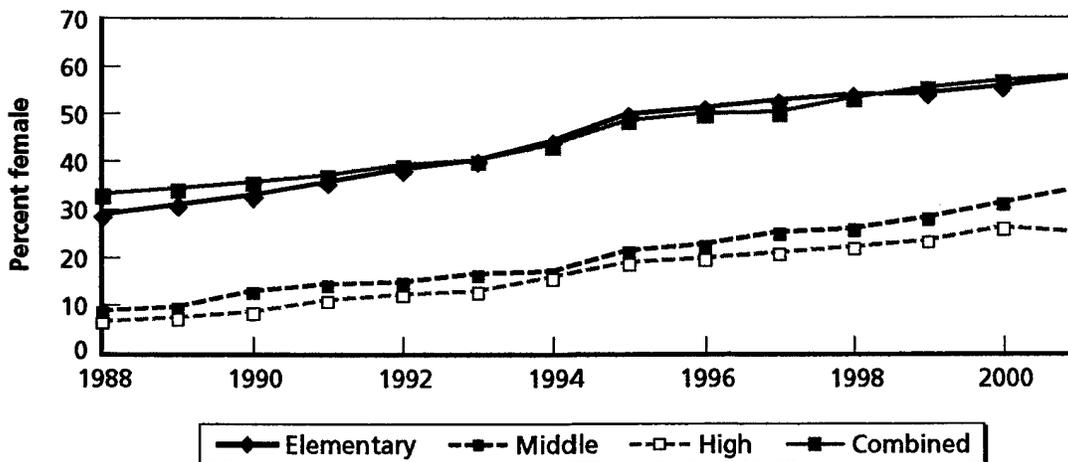
RAND TR129-A.1

**Figure A.1—Age Distribution of All Principals in Illinois, 1990-1991 and 2000-2001**



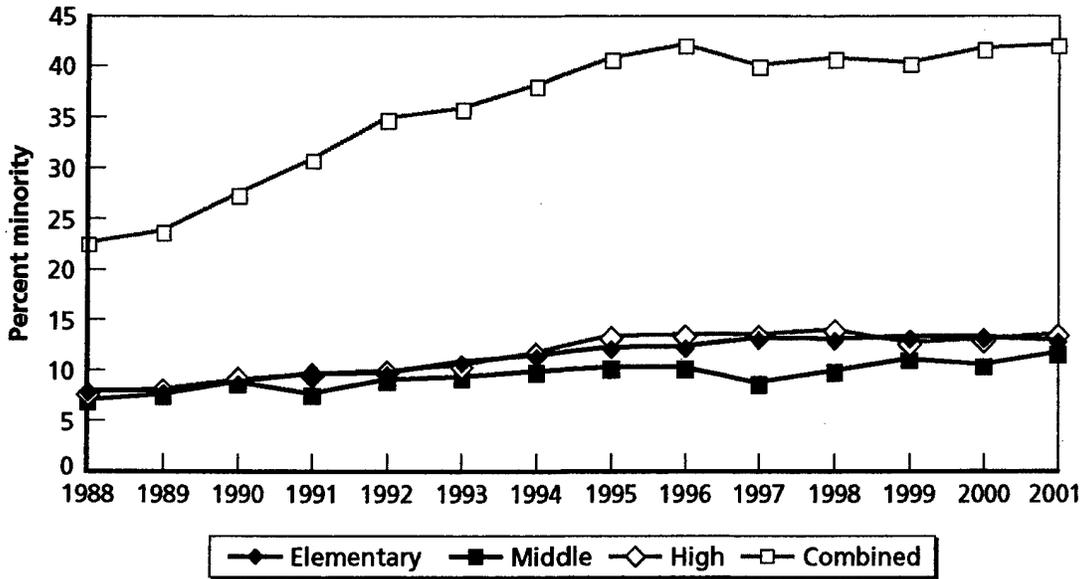
RAND TR129-A.2

Figure A.2—Age Distribution of First-Time Principals in Illinois, 1990-1991 and 2000-2001



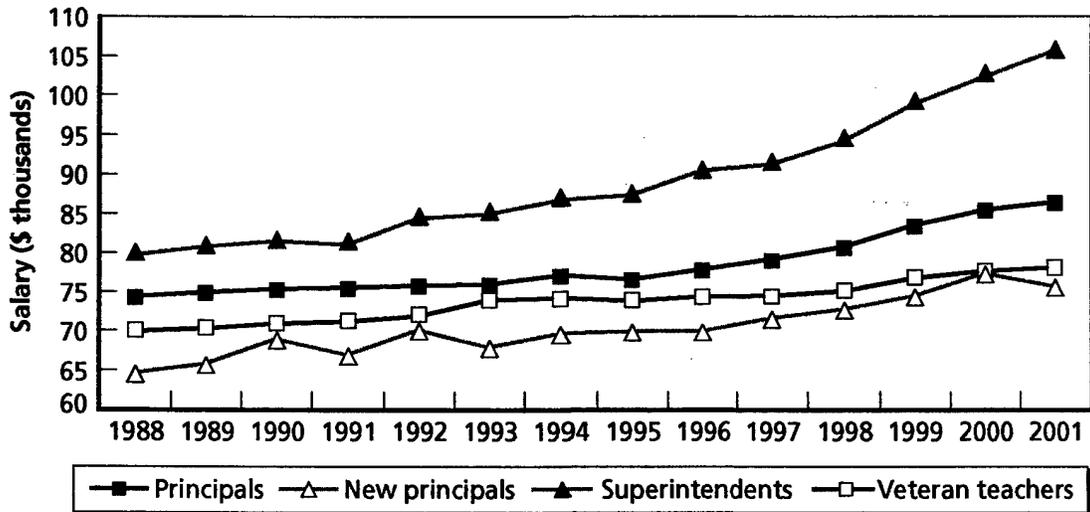
RAND TR129-A.3

Figure A.3—Proportion of Illinois Principals Who Are Female, by Grade Level



RAND TR123-A.4

Figure A.4—Proportion of Illinois Principals Who Are Minority, by Grade Level



RAND TR123-A.5

Figure A.5—Salary of Illinois Administrators, by Type and Year

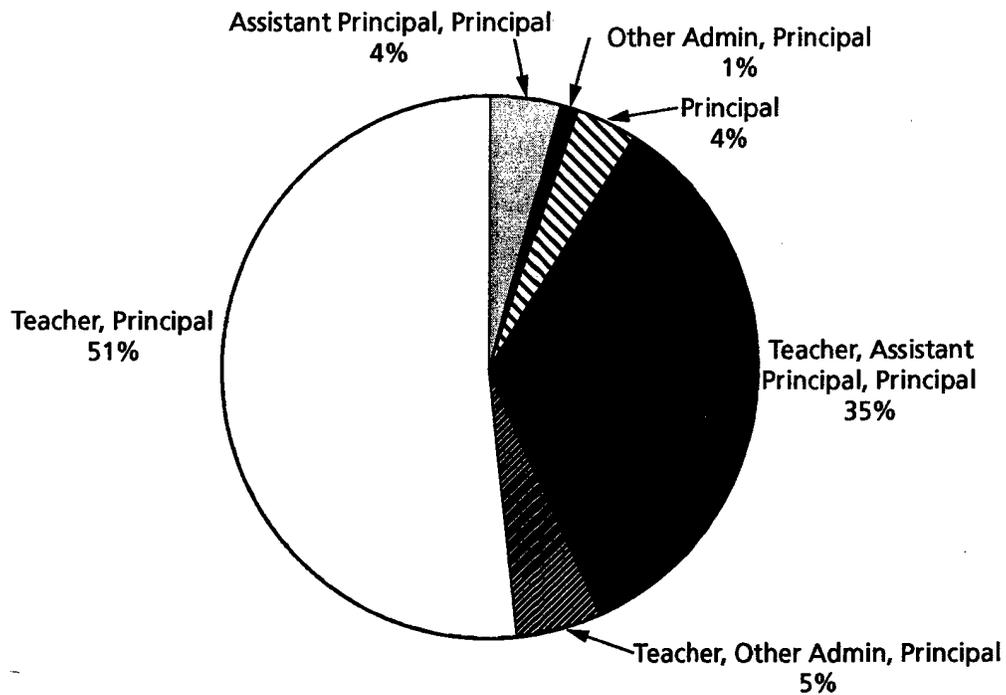
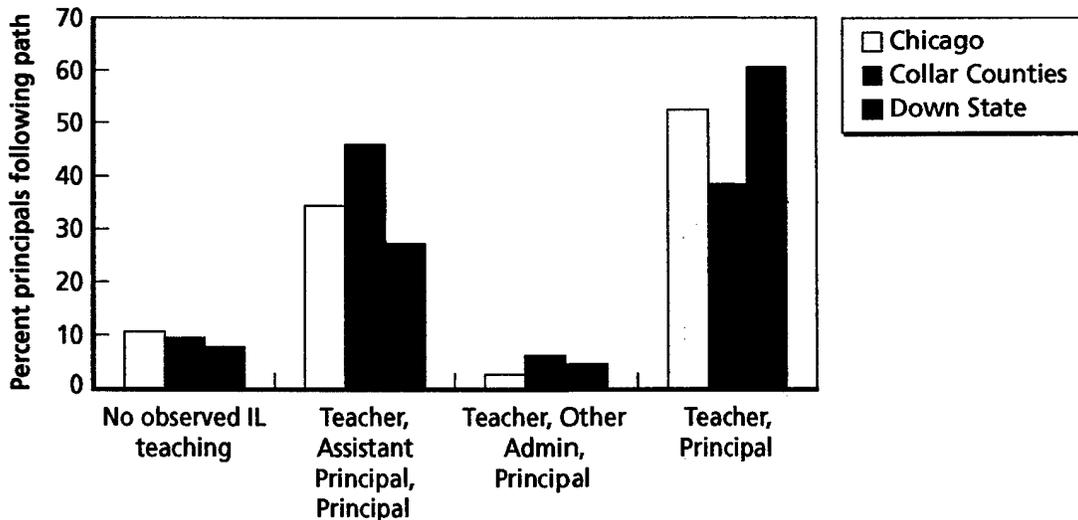
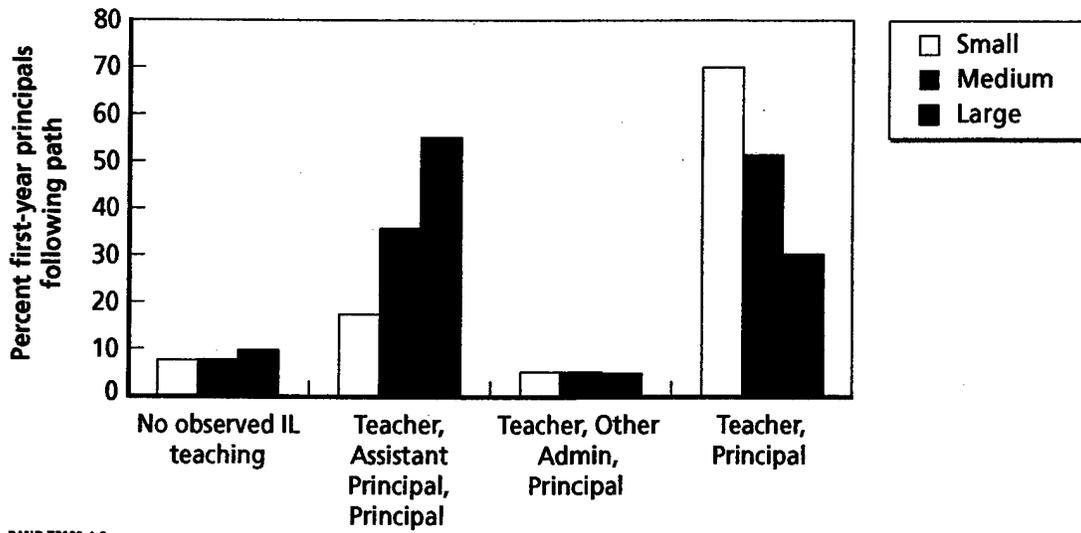


Figure A.6—Career Paths Followed by First-Year Principals, 1987-1999 Cohorts



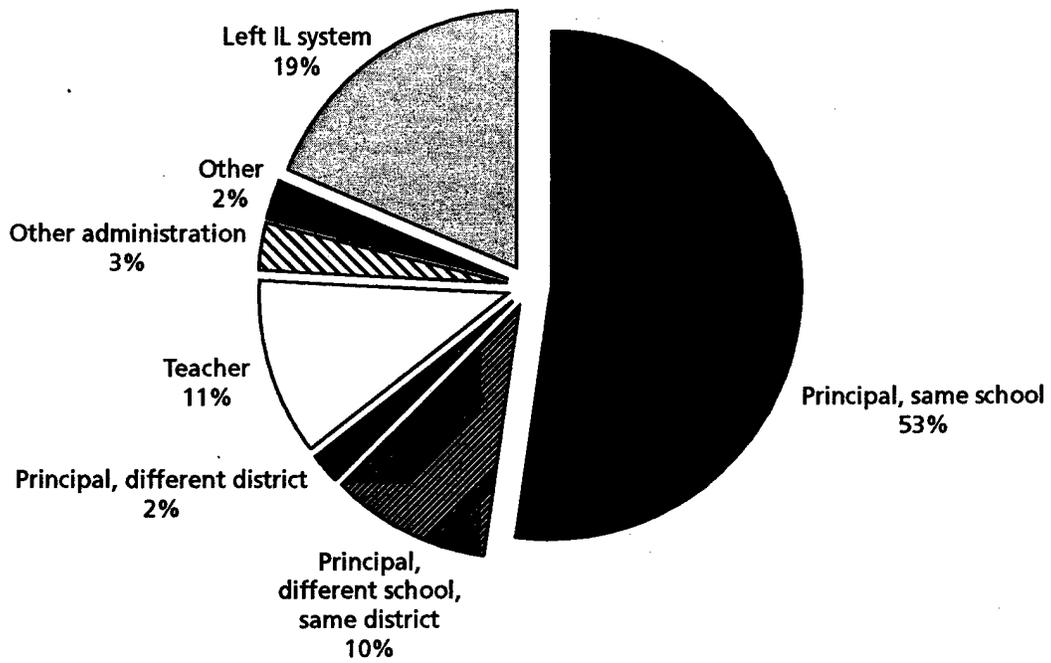
RAND TR123-A.7

Figure A.7—Career Paths Followed by First-Year Principals, 1987-1999 Cohorts, by Region



RAND TR123-A.8

**Figure A.8—Career Paths Followed by First-Year Principals, 1987-1999 Cohorts, by School Size**



RAND TR123-A.9

**Figure A.9—Position Held Six Years After First Principalship, 1987-1993 Cohorts, Chicago Only**

**Table A.1**  
**Characteristics of All Principals in Illinois, 1990,**  
**1995, 2000**

	1990	1995	2000
Age at beginning of school year	46.8	46.5	48.9
Age at first principalship	38.4	40.2	41.2
Percent over 50	32.1%	23.5%	44.9%
Percent over 55	14.1%	8.6%	13.8%
Years of experience as principal	8.66	6.87	8.3
Percent with master's degree	85.2%	87.5%	86.9%
Percent with Ph.D.	9.5%	8.2%	8.6%
Percent female	25.8%	39.7%	46.6%
Percent white	87.7%	82.7%	81.5%
Percent African-American	10.7%	14.8%	15.5%
Percent Hispanic	1.5%	2.4%	2.8%
Percent other race/ethnicity	0.1%	0.1%	0.2%
Percent Barron's ranking "highly competitive"	5.3%	4.8%	5.1%
Percent Barron's ranking "noncompetitive"	19.1%	19.9%	20.2%
Percent first-time principals	9.8%	19.4%	9.8%
N	3330	3400	3613

**Table A.2**  
**Characteristics of First-Time Principals in Illinois, 1990,**  
**1995, 2000**

	1990	1995	2000
Age at beginning of school year	42.5	44.2	44.1
Percent over 50	13.5%	14.9%	23.7%
Percent over 55	2.8%	5.8%	6.8%
Percent with master's degree	87.7%	88.8%	87.6%
Percent with Ph.D.	8.6%	7.1%	6.2%
Percent female	44.9%	53.6%	61%
Percent white	74.5%	77.8%	78.2%
Percent African-American	15.7%	19.3%	18.1%
Percent Hispanic	9.2%	2.7%	3.1%
Percent other race/ethnicity	0.1%	0.1%	0.1%
Percent Barron's ranking "highly competitive"	5.8%	4.7%	4.2%
Percent Barron's ranking "noncompetitive"	19.7%	20.8%	22%
Percent with a principal license	70.2%	76.7%	89.5%
N	325	658	354

**Table A.3**  
**Characteristics of Assistant Principals in Illinois, 1990,**  
**1995, 2000**

	1990	1995	2000
Age at beginning of school year	45	44.9	45.5
Percent over 50	22.9%	19.8%	32.3%
Percent over 55	10.7%	6.2%	9.1%
Percent with master's degree	89.5%	90.8%	91.4%
Percent with Ph.D.	6.1%	5.4%	4.4%
Percent female	28.7%	42.2%	49.2%
Percent white	79.9%	77.4%	75.9%
Percent African-American	18.2%	19.1%	20.3%
Percent Hispanic	1.4%	2.9%	3.1%
Percent other race/ethnicity	0.1%	0.1%	0.1%
Percent Barron's ranking "highly competitive"	6.8%	6.4%	6.2%
Percent Barron's ranking "noncompetitive"	19%	19.8%	20.9%
N	1019	1137	1483

**Table A.4**  
**Characteristics of Other Administrators in Illinois, 1990,**  
**1995, 2000**

	<b>1990</b>	<b>1995</b>	<b>2000</b>
Age at beginning of school year	45.8	45.3	47.1
Percent over 50	28.9%	19.5%	38.2%
Percent over 55	12.7%	6.9%	10.7%
Percent with Master's degree	79.1%	79.2%	77.7%
Percent with Ph.D.	10.3%	9.2%	9%
Percent female	30.9%	38.2%	41.6%
Percent white	89.9%	86.2%	85.2%
Percent African-American	8.7%	10.8%	11.5%
Percent Hispanic	1.1%	2.3%	2.7%
Percent other race/ethnicity	0.1%	0.1%	0.1%
Percent Barron's ranking "highly competitive"	7%	6%	5.8%
Percent Barron's ranking "noncompetitive"	12.7%	14.3%	16.7%
N	1510	1629	1965

**Table A.5**  
**Characteristics of Superintendents in Illinois, 1990,**  
**1995, 2000**

	1990	1995	2000
Age at beginning of school year	49.2	49.6	51.7
Percent over 50	44.6%	37.4%	62.9%
Percent over 55	17.7%	16.2%	20.3%
Percent with master's degree	45.4%	41.7%	42.9%
Percent with Ph.D.	34.9%	38.9%	40.9%
Percent female	6.3%	13.9%	14.4%
Percent white	96.8%	95.3%	94.1%
Percent African-American	2.7%	3.7%	4.6%
Percent Hispanic	0.1%	0.1%	0.1%
Percent other race/ethnicity	0%	0%	0.1%
Percent Barron's ranking "highly competitive"	4.4%	4.8%	4.8%
Percent Barron's ranking "noncompetitive"	13.6%	14.6%	19.3%
N	1389	1337	1385

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**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**  
**Descriptive Statistics of Variables Used in Three-Outcome Model**

Variable Name	Variable Definition	Mean	Std. Dev.	Min	Max
<b>Individual characteristics</b>					
AGE	Employee's age on September 1	41.70603	10.02199	19	82
AGESQ	The centered square of the employee's age	100.4537	115.8688	0.031636	1614.261
FEMALE	Employee is female (=1)	0.734422		0	1
AFRICAN-AMERICAN	Employee is African-American (=1)	0.123144		0	1
HISPANIC	Employee is Hispanic (=1)	0.02533		0	1
HICOMPETITIVE	Employee received undergraduate degree from institution ranked "most competitive" by Barron's (=1)	0.057811		0	1
NONCOMPETITIVE	Employee received undergraduate degree from institution ranked "noncompetitive" by Barron's (=1)	0.19421		0	1
MASTERS	Employee has a master's degree (=1)	0.459476		0	1
PHD	Employee has a Ph.D. (=1)	0.00606		0	1
EXPERIENCE	Years of experience in the Illinois school system	14.55768	9.452371	0	58
EXPERIENCESQ	Years of experience in the Illinois school system squared	89.38564	90.72607	0.002872	1870.252

School descriptors					
1989		0.069392		0	1
1990		0.070301		0	1
1991		0.072398		0	1
1992		0.073617		0	1
1993		0.074786		0	1
1994	School year ended in year indicated	0.074943		0	1
1995	(=1)	0.077167		0	1
1996		0.079208		0	1
1997		0.081278		0	1
1998		0.083479		0	1
1999		0.085906		0	1
2000		0.088344		0	1
SIZE100	Number of students enrolled in school (divided by 100)	8.09921	6.699698	0.01	42.97
PCTMINORITY	Percent minority students	0.338679	0.3536	0	1
SAMERACE	Employee is the same race/ethnicity as the majority of students (=1)	0.781178		0	1
MIDDLE	School is a middle school (=1)	0.131025		0	1
HIGH	School is a high school (=1)	0.288836		0	1
COMBINED	School is a combined school (=1)	0.199417		0	1
URBCHICAGO	School is an urban school in the Chicago area (=1)	0.197709		0	1
SUBCHICAGO	School is a suburban school in the Chicago area (=1)	0.369546		0	1
URBOTHER	School is in an urban area other than Chicago (=1)	0.076157		0	1
SUBOTHER	School is in a suburban area other than Chicago (=1)	0.083109		0	1

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**Interaction terms**

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FEMALE*AGE	30.37412	20.23172	0	82
FEMALE*AGESQ	75.79151	111.6482	0	1614.261
FEMALE*MIDDLE	0.086633		0	1
FEMALE*HIGH	0.145984		0	1
FEMALE*COMBINED	0.368723	0	0	1
AGE*1994	3.137169	11.33718	0	73
AGE*1995	3.165086	11.27705	0	74
AFRICAN-AM*1989	0.009507		0	1
AFRICAN-AM*1990	0.009545		0	1
AFRICAN-AM*1991	0.009643		0	1
AFRICAN-AM*1992	0.009568		0	1
AFRICAN-AM*1993	0.009745		0	1
AFRICAN-AM*1994	0.009287		0	1
AFRICAN-AM*1995	0.009265		0	1
AFRICAN-AM*1996	0.009317		0	1
AFRICAN-AM*1997	0.009403		0	1
AFRICAN-AM*1998	0.009478		0	1
AFRICAN-AM*1999	0.009512		0	1
AFRICAN-AM*2000	0.009474		0	1

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**Table B.2**  
**Career Paths of Administrators in Illinois:**  
**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
AGE	0.047	-0.107
	46.02**	19.15**
AGESQ	0.004	-0.001
	43.29**	1.66
FEMALE	0.784	-3.589
	14.34**	14.51**
AFRICAN-AMERICAN	-0.533	0.01
	6.85**	0.03
HISPANIC	-0.074	0.761
	2.36*	6.59**
HICOMPETITIVE	0.071	-0.036
	4.12**	0.45
NONCOMPETITIVE	-0.215	0.155
	17.94**	3.44**
MASTERS	-0.013	1.947
	1.22	37.02**
PHD	-0.01	3.533
	0.17	28.94**
EXPERIENCE	-0.041	0.06
	49.01**	13.17**
EXPERIENCESQ	0.004	-0.005
	48.28**	13.13**
1989	-0.116	0.26
	4.52**	2.32*
1990	-0.203	0.356
	7.96**	3.20**
1991	-0.235	0.226
	9.12**	2.00*
1992	-0.349	0.191
	13.19**	1.66
1993	0.308	0.644
	11.97**	6.16**
1994	-2.237	0.408
	31.49**	1.27
1995	0.123	-0.198
	2.06*	0.47
1996	-0.405	0.22
	15.41**	1.92
1997	-0.332	0.362
	13.30**	3.20**
1998	-0.171	0.407
	6.97**	3.61**
1999	0.008	0.602
	0.35	5.57**
2000	0.286	0.807
	12.59**	7.62**

FEMALE*AGE	-0.017	0.062
	18.26**	11.35**
FEMALE*AGESQ	0	-0.001
	3.23**	2.59**
AGE*1994	0.063	0.017
	41.31**	2.41*
AGE*1995	-0.011	0.014
	7.40**	1.49
AFRICAN-AMERICAN*1989	0.181	0.222
	1.63	0.55
AFRICAN-AMERICAN*1990	0.242	0.649
	2.33*	1.66
AFRICAN-AMERICAN*1991	0.34	0.77
	3.67**	2.16*
AFRICAN-AMERICAN*1992	-0.041	0.279
	0.4	0.7
AFRICAN-AMERICAN*1993	0.778	1.002
	8.92**	2.84**
AFRICAN-AMERICAN*1994	-0.108	0.526
	1.18	1.48
AFRICAN-AMERICAN*1995	0.36	0.867
	3.72**	2.35*
AFRICAN-AMERICAN*1996	0.269	0.702
	2.74**	1.84
AFRICAN-AMERICAN*1997	0.341	0.937
	3.60**	2.54*
AFRICAN-AMERICAN*1998	0.392	1.158
	4.36**	3.24**
AFRICAN-AMERICAN*1999	0.336	0.858
	3.75**	2.36*
AFRICAN-AMERICAN*2000	0.367	0.686
	4.17**	1.86
URBCHICAGO	-0.184	-0.91
	5.98**	9.01**
SUBCHICAGO	0.102	-0.577
	6.06**	9.57**
URBOTHER	0.069	-0.208
	2.89**	2.40*
SUBOTHER	0.072	-0.217
	3.43**	2.78**
SIZE100	-0.013	-0.061
	9.93**	10.85**
PCTMINORITY	0.142	0.369
	4.54**	3.63**
SAMERACE	-0.067	-0.007
	4.10**	0.13
MIDDLE	-0.014	0.094
	0.33	1.05
HIGH	0.164	-0.185
	4.09**	1.94
COMBINED	0.125	0.26
	2.79**	2.69**
FEMALE*MIDDLE	0.106	0.398
	2.41*	3.61**
FEMALE*HIGH	0.106	0.232
	2.70**	2.14*
FEMALE*COMBINED	-0.108	-0.08
	2.45*	0.72

Constant	-5.215	-2.709
	90.92**	11.80**
N	1402481	1402481

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NOTE: Robust z statistics below coefficients.

\* Significant at 5%.

\*\* Significant at 1%.

**Table B.3**  
**Career Paths of Administrators in Illinois: Descriptive Statistics of Variables Used in Two-Stage Model**

Variable Name	Variable Definition	Stage 1				Stage 2			
		Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
<b>Individual Characteristics</b>									
AGE	Employee's age on September 1	41.70603	10.02199	19	82	45.74655	7.196257	24	76
AGESQ	The centered square of the employee's age	100.4537	115.8688	0.031636	1614.261	67.18416	89.92004	0.031636	1168.126
FEMALE	Employee is female (=1)	0.734422		0	1	0.404411		0	1
AFRICAN-AMERICAN	Employee is African-American (=1)	0.123144		0	1	0.182821		0	1
HISPANIC	Employee is Hispanic (=1)	0.02533		0	1	0.032744		0	1
HICOMPETITIVE	Employee received undergraduate degree from institution ranked "most competitive" by Barron's (=1)	0.057811		0	1	0.06077		0	1
NONCOMPETITIVE	Employee received undergraduate degree from institution ranked "noncompetitive" by Barron's (=1)	0.19421		0	1	0.209027		0	1
MASTERS	Employee has a master's degree (=1)	0.459476		0	1	0.895458		0	1
PHD	Employee has a Ph.D. (=1)	0.00606		0	1	0.049002		0	1
EXPERIENCE	Years of experience in the Illinois school system	14.55768	9.452371	0	58	21.41722	7.404033	1	53
EXPERIENCESQ	Years of experience in the Illinois school system squared	89.38564	90.72607	0.002872	1870.252	99.22048	112.6898	0.060716	1462.788

School descriptors										
1989		0.069392		0	1		0.05969		0	1
1990		0.070301		0		1	0.061793		0	1
1991		0.072398		0		1	0.065602		0	1
1992		0.073617		0		1	0.067648		0	1
1993		0.074786		0		1	0.070263		0	1
1994	School year ended in year	0.074943		0		1	0.070434		0	1
1995	indicated (=1)	0.077167		0		1	0.076346		0	1
1996		0.079208		0		1	0.083111		0	1
1997		0.081278		0		1	0.087261		0	1
1998		0.083479		0		1	0.093457		0	1
1999		0.085906		0		1	0.101188		0	1
2000		0.088344		0		1	0.10818		0	1
SIZE100	Number of students enrolled in school (divided by 100)	8.09921	6.699698	0.01		42.97	10.67777	6.912227	0.09	42.97
PCTMINORITY	Percent minority students	0.338679	0.3536	0		1	0.392424	0.3517	0	1
SAMERACE	Employee is the same race/ethnicity as the majority of students (=1)	0.781178		0		1	0.74828		0	1
MIDDLE	School is a middle school (=1)	0.131025		0		1	0.220795		0	1
HIGH	School is a high school (=1)	0.288836		0		1	0.408448		0	1
COMBINED	School is a combined school (=1)	0.199417		0		1	0.159172		0	1
URBCHICAGO	School is an urban school in the Chicago area (=1)	0.197709		0		1	0.207322		0	1
SUBCHICAGO	School is a suburban school in the Chicago area (=1)	0.369546		0		1	0.432835		0	1
URBOTHER	School is in an urban area other than Chicago (=1)	0.076157		0		1	0.088		0	1
SUBOTHER	School is in a suburban area other than Chicago (=1)	0.083109		0		1	0.081064		0	1

**Interaction terms**

FEMALE*AGE	30.37412	20.23172	0	82	18.5425	23.0118	0	76
FEMALE*AGESQ	75.79151	111.6482	0	1614.261	29.59726	75.18264	0	1168.126
FEMALE*MIDDLE	0.086633		0	1	0.072878		0	1
FEMALE*HIGH	0.145984		0	1	0.122904		0	1
FEMALE*COMBINED				1				
	0.368723	0	0		0.096299		0	1
AGE*1994	3.137169	11.33718	0	73	3.219285	11.81767	0	73
AGE*1995	3.165086	11.27705	0	74	3.462391	12.1894	0	74
AFRICAN-AM*1989	0.009507		0	1	0.009266		0	1
AFRICAN-AM*1990	0.009545		0	1	0.009835		0	1
AFRICAN-AM*1991	0.009643		0	1	0.010744		0	1
AFRICAN-AM*1992	0.009568		0	1	0.011426		0	1
AFRICAN-AM*1993	0.009745		0	1	0.012336		0	1
AFRICAN-AM*1994	0.009287		0	1	0.012165		0	1
AFRICAN-AM *1995	0.009265		0	1	0.013814		0	1
AFRICAN-AM *1996	0.009317		0	1	0.01586		0	1
AFRICAN-AM *1997	0.009403		0	1	0.017282		0	1
AFRICAN-AM *1998	0.009478		0	1	0.019328		0	1
AFRICAN-AM *1999	0.009512		0	1	0.020351		0	1
AFRICAN-AM *2000	0.009474		0	1	0.022227		0	1

**Table B.4**  
**Career Paths of Administrators in Illinois:**  
**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
AGE	0.046	-0.1	-0.106	0.073	-0.049
AGESQ	45.69**	15.58**	14.34**	4.12**	5.62**
FEMALE	0.004	0	-0.001	0.006	0
AFRICAN-AMERICAN	42.77**	0.53	1.67	5.50**	0.09
HISPANIC	0.759	-2.865	-3.511	3.643	-1.375
HICOMPETITIVE	13.86**	9.97**	11.25**	4.18**	3.46**
NONCOMPETITIVE	-0.226	0.803	0.521	-0.283	0.271
MASTERS	11.11**	10.95**	5.46**	1.65	2.69**
PHD	-0.074	0.687	0.721	0.26	0.086
EXPERIENCE	2.35*	6.09**	4.77**	0.94	0.45
EXPERIENCESQ	0.069	-0.049	0.066	-0.428	0.113
1989	4.01**	0.52	0.61	1.5	0.88
1990	-0.215	0.103	0.138	-0.174	0.161
1991	17.90**	1.93	2.34*	1.41	2.18*
1992	-0.009	1.406	1.602	0.121	0.563
1993	0.81	24.85**	27.14**	0.57	3.16**
1994	0.004	2.502	3.065	0.15	0.952
1995	0.06	14.94**	17.50**	0.52	4.18**
1996	-0.041	0.042	0.058	-0.035	-0.024
	48.63**	8.65**	10.40**	2.48*	2.84**
	0.004	-0.004	-0.004	0.002	-0.001
	48.23**	9.08**	9.12**	2.34*	1.51
	-0.106	-0.132	0.271	-0.137	0.525
	4.20**	0.97	1.95	0.42	2.75**
	-0.185	0.169	0.523	-0.824	0.546
	7.50**	1.29	3.89**	2.19*	2.87**
	-0.211	0.004	0.189	-0.158	0.689
	8.53**	0.03	1.34	0.53	3.71**
	-0.366	-0.141	0.224	-0.373	0.287
	14.22**	1.07	1.59	1.18	1.49
	0.388	0.332	0.757	1.138	0.98
	15.30**	2.72**	6.02**	4.57**	5.41**
	-2.151	0.908	0.527	-2.967	0.757
	30.46**	2.40*	1.3	2.59**	1.17
	0.153	0.08	-0.113	-0.586	-0.191
	2.60**	0.19	0.23	0.45	0.26
	-0.388	0.146	0.065	-0.274	0.285
	15.26**	1.15	0.44	0.91	1.52

1997	-0.31	0.418	0.288	-0.192	0.319
	12.67**	3.51**	2.00*	0.67	1.69
1998	-0.14	0.455	0.498	-0.216	0.323
	5.89**	3.76**	3.63**	0.77	1.73
1999	0.03	0.752	0.451	0.095	0.613
	1.33	6.50**	3.27**	0.35	3.38**
2000	0.312	0.672	0.628	0.599	0.665
	14.05**	5.74**	4.66**	2.33*	3.72**
FEMALE*AGE	-0.017	0.042	0.063	-0.057	0.043
	17.82**	6.88**	8.93**	2.97**	4.81**
FEMALE*AGESQ	0	-0.001	-0.001	-0.002	-0.002
	2.68**	2.33*	1.4	1.57	2.02*
AGE*1994	0.061	0	0.015	0.084	0.014
	40.14**	0.01	1.64	3.71**	0.93
AGE*1995	-0.011	0.009	0.014	0.007	0.016
	7.76**	0.9	1.21	0.27	0.98
SIZE100	-0.013	-0.013	-0.119	0.002	-0.022
	10.02**	2.54*	11.72**	0.19	2.84**
PCTMINORITY	0.147	0.429	0.33	0.294	0.439
	4.73**	3.81**	2.35*	1.19	2.81**
SAMERACE	-0.063	-0.058	0.026	0.279	0.158
	3.85**	0.97	0.33	1.91	1.78
MIDDLE	-0.008	0.261	-0.301	0.173	-0.152
	0.2	2.45*	2.43*	0.65	1.14
HIGH	0.173	-0.293	-0.173	0.152	-0.291
	4.30**	2.63**	1.56	0.53	2.02*
COMBINED	0.13	-0.17	0.231	0.181	0.125
	2.90**	1.35	2.00*	0.6	0.78
FEMALE*MIDDLE	0.104	0.307	0.421	-0.785	0.054
	2.32*	2.21*	2.70**	2.35*	0.3
FEMALE*HIGH	0.1	0.721	0.218	-0.292	-0.514
	2.51*	5.89**	1.56	0.97	2.83**
FEMALE*COMBINED	-0.112	0.23	-0.153	-0.695	-0.425
	2.52*	1.65	1.14	2.00*	2.18*
URBCHICAGO	-0.182	0.322	-0.46	-0.672	-1.003
	5.93**	2.56*	3.39**	2.61**	6.00**
SUBCHICAGO	0.104	0.226	-0.918	-0.184	-0.537
	6.21**	2.74**	11.38**	1.06	5.25**
URBOTHER	0.068	0.244	-0.437	-0.02	-0.205
	2.88**	2.19*	3.95**	0.1	1.56
SUBOTHER	0.071	0.126	-0.293	0.104	-0.299
	3.37**	1.15	2.95**	0.48	2.16*
Constant	-5.225	-3.523	-2.611	-7.506	-0.454
	91.24**	12.69**	8.73**	8.64**	1.16
N	1382683	1382683	1382683	16119	16119

NOTE: Robust z statistics below coefficients.

\* Significant at 5%.

\*\* Significant at 1%.

**Table B.5**  
**Career Paths of Administrators in Illinois:**  
**Descriptive Statistics of Variables Used in Superintendents Model**

Variable Name	Variable Definition	Mean	Std. Dev.	Min	Max
<b>Individual characteristics</b>					
AGE	Employee's age on September 1	41.78899	9.979777	19	82
AGESQ	The centered square of the employee's age	99.59699	115.3725	0.031636	1614.261
FEMALE	Employee is female (=1)	0.727433		0	1
AFRICAN-AMERICAN	Employee is African-American (=1)	0.122971		0	1
HISPANIC	Employee is Hispanic (=1)	0.025256		0	1
HICOMPETITIVE	Employee received undergraduate degree from institution ranked "most competitive" by Barron's (=1)	0.057611		0	1
NONCOMPETITIVE	Employee received undergraduate degree from institution ranked "noncompetitive" by Barron's (=1)	0.194132		0	1
MASTERS	Employee has a master's degree (=1)	0.468274		0	1
PHD	Employee has a Ph.D. (=1)	0.007272		0	1
EXPERIENCE	Years of experience in the Illinois school system	14.69958	9.455375	0	58
EXPERIENCESQ	Years of experience in the Illinois school system squared	89.40697	90.91533	0.002872	1870.252
<b>School descriptors</b>					
1989	School year ended in year indicated (=1)	0.069159		0	1
1990		0.070133		0	1
1991		0.072277		0	1
1992		0.07355		0	1
1993		0.074734		0	1
1994		0.075		0	1
1995		0.07729		0	1
1996		0.079348		0	1
1997		0.081416		0	1
1998		0.083627		0	1
1999		0.086056		0	1

2000		0.0885		0	1
SIZE100	Number of students enrolled in school (divided by 100)	8.031721	6.667144	0.01	42.97
PCTMINORITY	Percent minority students	0.337202	0.353208	0	1
SAMERACE	Employee is the same race/ethnicity as the majority of students (=1)	0.783154		0	1
MIDDLE	School is a middle school (=1)	0.131102		0	1
HIGH	School is a high school (=1)	0.286562		0	1
COMBINED	School is a combined school (=1)	0.198834		0	1
URBCHICAGO	School is an urban school in the Chicago area (=1)	0.195975		0	1
SUBCHICAGO	School is a suburban school in the Chicago area (=1)	0.369083		0	1
URBOTHER	School is in an urban area other than Chicago (=1)	0.076352		0	1
SUBOTHER	School is in a suburban area other than Chicago (=1)	0.083425		0	1
<b>Interaction terms</b>					
FEMALE*AGE		30.12708	20.36797	0	82
FEMALE*AGESQ		74.80947	111.1327	0	1614.261
FEMALE*MIDDLE		0.085465		0	1
FEMALE*HIGH		0.143597		0	1
FEMALE*COMBINED		0.160676		0	1
AGE*1994		3.145482	11.3583	0	73
AGE*1995		3.177659	11.30751	0	74
AFRICAN-AMERICAN*1989		0.009388		0	1
AFRICAN-AMERICAN*1990		0.00944		0	1
AFRICAN-AMERICAN*1991		0.009563		0	1
AFRICAN-AMERICAN*1992		0.009515		0	1
AFRICAN-AMERICAN*1993		0.009699		0	1
AFRICAN-AMERICAN*1994		0.009282		0	1
AFRICAN-AMERICAN*1995		0.009294		0	1
AFRICAN-AMERICAN*1996		0.009358		0	1
AFRICAN-AMERICAN*1997		0.009449		0	1
AFRICAN-AMERICAN*1998		0.009544		0	1
AFRICAN-AMERICAN*1999		0.009595		0	1
AFRICAN-AMERICAN*2000		0.009567		0	1

**Table B.6**  
**Career Paths of Administrators in Illinois:**  
**Three-Outcome Multinomial Logit Model**  
**Regression Results of Principal Characteristics on Career Path**

<b>Individual and District Characteristics</b>		
<b>Variable Name</b>	<b>Drop Out</b>	<b>Become Superintendent</b>
AGE	0.048	-0.071
	48.26**	4.99**
AGESQ	0.004	-0.004
	43.87**	3.55**
FEMALE	0.825	-4.067
	17.3**	5.87**
AFRICAN-AMERICAN	-0.223	0.641
	11.83**	3.29**
HISP	-0.091	0.723
	2.98**	1.92
HICOMPETITIVE	0.072	0.059
	4.15**	0.36
NONCOMPETITIVE	-0.211	0.149
	17.69**	1.41
MASTERS	-0.022	2.046
	2.05**	13.51**
PHD	-0.011	4.864
	0.2	25.27**
EXPERIENCE	-0.042	0.093
	50.47**	6.39**
EXPERIENCESQ	0.004	-0.004
	49.77**	4.15**
1989	-0.114	0.271
	4.7**	1.23
1990	-0.196	0.281
	8.22**	1.31
1991	-0.207	0.306
	8.58**	1.39
1992	-0.354	0.255
	14.23**	1.17
1993	0.398	0.525
	15.95**	2.47**
1994	-2.184	-0.442
	30.98**	0.55
1995	0.141	-0.85
	2.4**	0.77
1996	-0.384	0.074
	15.51**	0.3
1997	-0.303	0.354
	12.77**	1.52

1998	-0.139	0.412
	6.02**	1.77
1999	0.04	0.82
	1.83**	3.9**
2000	0.32	0.804
	14.98**	3.71**
FEMALE*AGE	-0.017	0.06
	19.08**	3.79**
FEMALE*AGESQ	-0.0004	0
	3.73**	0.26
AGE*1994	0.062	0.037
	41.05**	2.09*
AGE*1995	-0.01	0.031
	7.45**	1.28
URBCHICAGO	-0.233	27.676
	2.78**	3.94**
SUBCHICAGO	0.061	-1.212
	4.2**	11.1**
URBOTHER	0.054	-0.922
	2.44((	3.79**
SUBOTHER	0.039	-0.802
	1.91	5.26**
DISTSIZ100	0	-0.008
	1.17	4.31**
Constant	-5.311	-6.033
	111.5**	12.17**
Observations	1457190	1457190

NOTE: Robust z statistics in parentheses.

\* Significant at 5%.

\*\* Significant at 1%.

**Table B.7**  
**Career Paths of Administrators in Illinois:**  
**Descriptive Statistics of Variables Used in Attrition Model**

Variable Name	Variable Definition	Mean	Std. Dev.	Min	Max
<b>Individual characteristics</b>					
AGE	Employee's age on September 1	47.28982	7.04839	24	80
AGESQ	The centered square of the employee's age	49.67868	69.69619	0.083999	1069.956
FEMALE	Employee is female (=1)	0.351576		0	1
AFRICAN-AMERICAN	Employee is African-American (=1)	0.133161		0	1
HISPANIC	Employee is Hispanic (=1)	0.019676		0	1
OTHERRACE	Employee is of another race/ethnicity (=1)	0.001261		0	1
HICOMPETITIVE	Employee received undergraduate degree from institution ranked "most competitive" by Barron's (=1)	0.04946		0	1
NONCOMPETITIVE	Employee received undergraduate degree from institution ranked "noncompetitive" by Barron's (=1)	0.196893		0	1
MASTERS	Employee has a master's degree (=1)	0.866299		0	1
PHD	Employee has a PhD (=1)	0.089104		0	1
EXPERIENCE	Years of experience in the Illinois school system	22.56407	7.77412	1	61
EXPERIENCESQ	Years of experience in the Illinois school system squared	60.43559	85.58189	0.026918	1477.321
<b>School descriptors</b>					
1989	School year ended in year indicated (=1)	0.074201		0	1
1990		0.074966		0	1
1991		0.075709		0	1
1992		0.076069		0	1
1993		0.075304		0	1
1994		0.075439		0	1
1995		0.076542		0	1
1996		0.077623		0	1
1997		0.078253		0	1
1998		0.079514		0	1

1999		0.080234		0	1
2000		0.081337		0	1
SIZE100	Number of students enrolled in school (divided by 100)	5.20135	4.103005	0.06	42.97
PCTMINORITY	Percent minority students	0.298334	0.342822	0	1
SAMERACE	Employee is the same race/ethnicity as that of the majority of students (=1)	0.857744		0	1
MIDDLE	School is a middle school (=1)	0.138226		0	1
HIGH	School is a high school (=1)	0.178861		0	1
COMBINED	School is a combined school (=1)	0.189937		0	1
URBCHICAGO	School is an urban school in the Chicago area (=1)	0.155628		0	1
SUBCHICAGO	School is a suburban school in the Chicago area (=1)	0.340387		0	1
URBOTHER	School is in an urban area other than Chicago (=1)	0.082936		0	1
SUBOTHER	School is in a suburban area other than Chicago (=1)	0.094394		0	1
<b>Interaction terms</b>					
FEMALE*AGE		16.6995	23.08814	0	80
FEMALE*AGESQ		18.34464	52.00236	0	1069.956
FEMALE*MIDDLE		0.026069		0	1
FEMALE*HIGH		0.027758		0	1
FEMALE*COMBINED		0.083926		0	1
AGE*1994		3.544906	12.53943	0	72
AGE*1995		3.559574	12.49283	0	73
AFRICAN-AMERICAN*1989		0.007362		0	1
AFRICAN-AMERICAN*1990		0.008037		0	1
AFRICAN-AMERICAN*1991		0.008892		0	1
AFRICAN-AMERICAN*1992		0.009658		0	1
AFRICAN-AMERICAN*1993		0.009951		0	1
AFRICAN-AMERICAN*1994		0.010221		0	1
AFRICAN-AMERICAN*1995		0.011301		0	1
AFRICAN-AMERICAN*1996		0.011594		0	1
AFRICAN-AMERICAN*1997		0.011684		0	1
AFRICAN-AMERICAN*1998		0.012134		0	1
AFRICAN-AMERICAN*1999		0.012494		0	1
AFRICAN-AMERICAN*2000		0.012629		0	1

**Table B.8**  
**Career Paths of Administrators in Illinois:**  
**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
AGE	0.156	-0.035	-0.005
	14.37**	5.14**	0.7
AGESQ	0.002	0	0
	1.85	0.72	0.07
FEMALE	3.224	0.06	1.124
	4.82**	0.2	2.85**
AFRICAN-AMERICAN	-0.254	0.143	0.358
	0.61	0.48	1.03
HISP	-0.433	0.256	0.786
	1.58	2.27*	5.08**
OTHER	0.211	0.888	1.788
	0.39	2.20*	5.69**
HICOMPETITIVE	-0.146	0.007	0.071
	1.46	0.08	0.67
NONCOMPETITIVE	-0.052	0.01	0.066
	0.84	0.22	1.06
MASTERS	0.056	-0.018	-0.48
	0.48	0.19	4.22**
PHD	-0.056	0.014	0.115
	0.39	0.13	0.88
EXPERIENCE	0.001	-0.03	-0.033
	0.24	5.65**	5.62**
EXPERIENCESQ	0.004	-0.001	-0.001
	11.12**	2.08*	2.59**
1989	0.242	0.144	0.317
	1.77	1.45	2.48*
1990	0.403	-0.028	0.23
	3.03**	0.28	1.78
1991	0.329	-0.111	0.094
	2.48*	1.07	0.72
1992	0.348	-0.045	0.242
	2.60**	0.44	1.91
1993	1.079	0.099	0.166
	8.82**	0.97	1.23
1994	-1.826	0.703	-0.166
	2.74**	1.52	0.3
1995	-0.563	-3.631	-1.196
	0.65	9.60**	1.77
1996	-0.408	-0.137	0.053
	2.45*	1.29	0.4

1997	-0.125	-0.182	0.015
	0.86	1.66	0.11
1998	-0.104	0.11	0.238
	0.7	1.07	1.81
1999	0.121	-0.108	0.227
	0.88	0.98	1.78
2000	0.439	0.055	0.338
	3.39**	0.52	2.60**
FEMALE*AGE	-0.065	-0.001	-0.023
	4.62**	0.19	2.77**
FEMALE*AGESQ	-0.002	0	-0.001
	1.6	0.71	1.13
AGE*1994	0.067	-0.003	0.023
	5.10**	0.32	1.99*
AGE*1995	0.015	0.108	0.034
	0.91	13.62**	2.29*
AFRICAN-AM*1989	-0.638	-0.352	-1.264
	1.01	0.8	2.03*
AFRICAN-AM*1990	0.241	0.069	0.058
	0.46	0.17	0.13
AFRICAN-AM*1991	-0.016	-0.312	-0.13
	0.03	0.85	0.32
AFRICAN-AM*1992	-0.054	-0.63	-1.294
	0.11	1.6	2.64**
AFRICAN-AM*1993	0.399	-0.383	-0.155
	0.87	1.02	0.36
AFRICAN-AM*1994	-0.531	-0.479	-0.512
	1.14	1.33	1.27
AFRICAN-AM*1995	0.998	1.128	0.693
	1.95	3.62**	1.71
AFRICAN-AM*1996	0.012	-0.7	-0.2
	0.02	1.79	0.47
AFRICAN-AM*1997	0.143	-0.464	-0.4
	0.29	1.22	0.91
AFRICAN-AM*1998	0.335	-0.429	-0.297
	0.69	1.22	0.74
AFRICAN-AM*1999	0.14	-0.425	-0.164
	0.3	1.13	0.4
AFRICAN-AM*2000	-0.181	-0.311	-0.466
	0.38	0.87	1.09
SIZE100	-0.014	-0.061	-0.032
	2.27*	7.85**	4.41**
PCTMINORITY	-0.102	0.251	0.419
	0.74	2.08*	3.14**
SAMERACE	-0.289	-0.141	-0.007
	3.45**	2.07*	0.08
MIDDLE	-0.015	0.054	0.351
	0.18	0.76	4.25**
HIGH	0.123	0.174	0.673
	1.52	2.11*	8.49**

COMBINED	-0.013	0.384	0.455
	0.14	4.61**	4.92**
FEMALE*MIDDLE	0.144	0.155	-0.308
	0.82	1.14	1.84
FEMALE*HIGH	0.473	0.127	0.144
	3.19**	0.72	1.02
FEMALE*COMBINED	0.214	-0.15	-0.16
	1.56	1.56	1.17
URBCHICAGO	-0.468	0.22	-0.831
	3.73**	2.14*	6.02**
SUBCHICAGO	0.001	-0.246	-0.188
	0.02	4.11**	2.60**
URBOTHER	0.183	-0.099	0.004
	1.91	1.16	0.04
SUBOTHER	-0.133	-0.15	-0.013
	1.43	1.92	0.14
Constant	-10.982	0.049	-1.829
	21.24**	0.17	6.04**
N	43430	43430	43430

NOTE: Robust z statistics below coefficients.

\* Significant at 5%.

\*\* Significant at 1%.

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