

Principal Retention in the State of Delaware, 2001-2008

December 2010



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Health Services Policy Research Group
Center for Community Research and Service
School of Administration and Public Policy
College of Arts and Sciences
University of Delaware

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PREFACE

This report presents an initial evaluation of the retention and turnover of Principals and Assistant Principals who supervise and manage educational instruction in the primary and secondary public schools of the state of Delaware. The evaluation was funded in 2010 by The Wallace Foundation and sponsored by the Delaware Academy of School Leadership (DASL) of the University of Delaware. The evaluation has been conducted in 2010 by the Health Services Policy Research Group (HSPRG) of the Center for Community Research and Service (CCRS) of the University of Delaware.

EXECUTIVE SUMMARY

This report presents an initial evaluation of the retention and turnover of Principals and Assistant Principals who supervise and manage educational instruction in the primary and secondary public schools of the state of Delaware. The evaluation was funded in 2010 by The Wallace Foundation and sponsored by the Delaware Academy of School Leadership (DASL) of the University of Delaware. The evaluation has been conducted in 2010 by the Health Services Policy Research Group (HSPRG) of the Center for Community Research and Service (CCRS) of the University of Delaware.

The following presents a summary of our findings:

- Over the past decade, as reported in various media, some public officials and educational administrators have voiced anxiety over the retention and turnover of Principals within the public school system in the United States. However, a review of the literature reveals that there has been no empirical study that verifies whether turnover is a mechanism which facilitates or hinders the promotion and retention of Principals with the highest qualifications. Moreover, there are no academic studies that document whether the level of turnover and retention is associated with Principal performance as well as student achievement within schools.
- The discussion of different possible moves available to Principals and Assistant Principals has revealed a high degree of complexity in the array of moves that could be made by individuals in their careers as school leaders, including role and place changes occurring both within and outside of the Delaware education system. In what is defined as a short-term perspective, multiple cohorts of either Principals or Assistant Principals who entered the public school system at different time periods are measured jointly for their retention and/or turnover behavior during the same particular time period, most commonly in a year. This perspective entails a static viewpoint or orientation in which retention and turnover are depicted at a particular point in time, e.g., annually. A long-term perspective focuses on separate groups of individuals who become Principals and/or Assistant Principals by determining their retention at jobs or moving among jobs over their tenure in the school system. This perspective encompasses a more dynamic view of retention and turnover that is concerned with the churning of positions by Principals and Assistant Principals as represented by their career path movements.

- A review of the literature found six published articles/reports on Principal retention and turnover. Many of these studies have either methodological, research design, and/or statistical and data limitations or weaknesses. None of the reviewed studies makes a clear distinction that retention and turnover can be viewed from two perspectives; in fact several studies provide a limited data profile based on one perspective and then conduct statistical modeling of data that measures the second perspective.
- The profile of the Delaware administrator workforce, -- (inclusive of Principals' and Assistant Principals' moves, and moves to and from central administrative offices), -- indicates stability in the gender, race, and state (of Delaware) origins of those leading our schools over time and across geographic locations. At the same time, there appears to be variation in the distribution of gender across school level and some significant change over time in the age and experience levels of administrators. High schools have a larger proportion of male administrators while females are more prevalent as administrators in elementary schools. Over time, the average age and average years of teaching experience has declined for Delaware administrators.
- From a static view, the stability of administration within districts is very striking. Between 80% and 94% of Principals are retained in that role, though not necessarily the same school, between any two years. Of those remaining in their district, most continue in their same school, followed by between 2% and 10% of the total administrative population who move to another school.
- When examining cohorts of new Principals as they move through their careers (the dynamic or longitudinal approach), the picture is one of much greater mobility, with only a third remaining in their initial school after 5 years and nearly 43% no longer continuing as a Principal (i.e., retired, left (non-retirees, central office, returned to teaching). For Assistant Principals, a greater proportion move between districts and positions with fewer leaving the system.
- Statistical analyses were conducted to confirm the determinants (or bases) of tenure and retention behavior of *new* Principals. This analyses entailed the estimation of both tenure and retention equations. Two tenure equations were derived (tenure defined as length at a position and tenure defined as length of time as a Principal) using the Mincer human capital model from labor economics. Six retention equations were calculated using the complementary log-log model. Independent variables included individual characteristics (such as age, gender, administrative experience), school characteristics (such as percent of students suspended, level of school), and district characteristics (such as expenditure per pupil and number of schools within the district).

- Few statistically significant variables were verified as common determinants in the tenure and the retention equations. The demographic characteristics – age, gender, and race – have some effects on administrators’ behavior but they are strongest in predicting retirement. On the other hand, Principals’ professional characteristics appear to have a more substantial effect on their careers: administrative experience and number of prior moves as a Principal are significant in all models, salary is significant in four, and teaching experiences is significant in two. Differences between elementary, middle, and high schools weren’t evident, and geographic differences by county only affected retirement. However, in terms of movement between schools, across districts, to the central office and out of the Delaware system, it appears that more challenging school conditions increased the likelihood of turnover. Finally, across models, few district characteristics appear significant. The most notable is district expenditures per pupil, which was found to be positively associated with tenure in position, tenure as Principal, and movement to the central office.

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I. OVERVIEW OF REPORT

A. Objective of Report

This report presents an initial evaluation of the retention and turnover of Principals and Assistant Principals who supervise and manage educational instruction in the primary and secondary public schools of the state of Delaware. The evaluation was funded in 2010 through a contract with Delaware Academy of School Leadership (DASL) of the University of Delaware. The evaluation has been conducted in 2010 by the Health Services Policy Research Group (HSPRG) of the Center for Community Research and Service (CCRS) of the University of Delaware.

The evaluation has a two-fold focus. First, it presents various profiles of Principals and Assistant Principals in their entrance into, their movement among and departure from their administrative jobs (indicating turnover) as well as their continuation in their administrative jobs (generally referred to as retention) within the state of Delaware public school system. Second, an exploratory and limited statistical (econometric) analysis is undertaken of the determinants (“causes”) of several dimensions of retention and turnover behavior of only Principals new to the Delaware public school system. Most of the analyses of the report encompass the time frame of the school years 1995/1996 through 2009/2010. Both the profiles and statistical (econometric) analyses were undertaken with data collected from the State of Delaware’s Department of Education (DOE) as well as Internet sources of Delaware school districts. The DOE data sets encompass records for (a) every school year from 1995/1996 through 2009/2010, and (b) every Principal and Assistant Principal employed for all public school districts, including charter schools, within the state of Delaware. Because of the large volume of data and analyses, many tables are placed in the appendix. Also, because of the technical dimensions of the exploratory empirical analysis (i.e., the tested equations), some statistical estimates are placed in the appendix, and the statistical results are described in non-technical terminology within the text.

B. Scope of Report

The scope of the present report is, of course, constrained by the limits of time and funding resources to conduct analyses. However, the scope of the report is guided and governed by the substantial complexity of retention and turnover that characterizes the workforce activities of Principals and Assistant Principals. Consideration of this complexity emerged from two sources:

(a) the data compilation of Delaware Principals and Assistant Principals that indicated many different dimensions of turnover and retention activities, and (b) secondarily, by the research issues raised in the limited academic empirical literature on the tenure, retention and turnover of Principals in public school systems.

These lines of inquiry revealed two observations that are discussed below in more detail. First, there are many different dimensions and a significant range of retention and turnover activities in which Principals and Assistant Principals can engage as administrators in the public school system. Second, there are two distinct perspectives of Principal and Assistant Principal retention and turnover. That is the movement into and out of administrative positions by Principals and Assistant Principals can be assessed by two different viewpoints. One perspective entails a static viewpoint or orientation in which retention and turnover are depicted at a particular point in time, e.g., annually. A second perspective encompasses a more dynamic view of retention and turnover that is concerned with the churning of positions by Principals and Assistant Principals as represented by their career path movements.

C. Outline of Report

The remainder of the report is comprised of the following sections. In Section II, the background for the report is given through a discussion of the policy concerns for investigating the retention and tenure of Principals and Assistant Principals as well as the general consideration of the two different perspectives that characterize the retention and turnover activities of Principals and Assistant Principals. Section III provides definitions of concepts, terminology, and measures of the retention and turnover of Principal and Assistant Principals that are employed for the analysis. Here, the complex dimensions of retention and turnover are discussed in detail. In Section IV, a review of retention and turnover studies is presented. Five of the six studies appeared in peer-reviewed publications. Empirical analyses of the tenure and retention of is provided in Section V. A profile of the retention and turnover of Delaware public school Principals is presented in the form of tabular displays and figures, and charts in the first part of Section V. This profile includes a brief presentation of the demographic characteristics of public school Principals and Assistant Principals as well as descriptions of the various dimensions and different perspectives of their retention and turnover activities. The second part of section five encompasses the statistical or econometric analyses of the determinants (or

“causes”) of the career perspective of retention and turnover of only Principals. Section 6 provides concluding remarks.

II. BACKGROUND OF THE ANALYSES

This section will utilize the terminology of retention, turnover, and tenure in a very general way with respect to the job positions of Principals and Assistant Principals between any two periods, -- e.g., the school year 2000 and 2001. Retention will indicate that Principals or Assistant Principals have remained in their previous administrative position. Turnover will signify that a Principals or Assistant Principals have moved or left their previously-held administrative position. Tenure merely refers to the length of time a person has remained in a particular position as Principal or Assistant Principal. These three concepts will be refined further in Section Three.

A. Policy Concerns

Over the past decade, as reported in various media, some public officials and educational administrators have voiced anxiety over the retention and turnover of Principals within the public school system in the United States. Some of the concern has been directed at the difficulty of replacing such personnel as well as the recruitment cost entailed in their replacement. One basis of officials’ concern is that high level turnover is viewed as an obstacle to leadership stability that is essential for the academic performance of a Principal’s assigned school. Such an orientation has its source in the limited evidence that effective Principals are important for improving both teacher and student performance (Leithwood, et al, 2004, Seashore-Louis, et al, 2010; Hallinger and Heck, 1998; Waters, Marzano, and McNulty, 2003; Robinson, Lloyd, and Rowe, 2008).).

However, the evidence is negligible that stability in a position as Principals, -- (i.e., longevity in the role of Principal at a particular school), -- enhances their administrative performance at their assigned schools. Likewise, available evidence does not support any conclusions that turnover is (a) detrimental because effective Principals leave their positions, or (b) constructive because ineffective Principals leave their positions (Gates, et al, 2006). Put differently, there has been no empirical study that verifies whether turnover is a mechanism which facilitates or hinders the promotion and retention of Principals with the highest qualifications. Moreover, there are no academic studies that document whether the level of

turnover and retention is associated with Principal performance as well as student achievement within schools.

B. Research Issues

One can put aside the issues pertaining to the potential impacts of the retention and turnover of Principals on educational outcomes to address a more fundamental subject. Presently, knowledge about the actual retention and turnover behavior of Principals is very limited. In addition, there is little understanding of the actual retention and turnover activities of assistant (or vice) Principals, who seemingly are the potential successors of Principals through their own turnover in the public school system. Only a few rigorous statistical (modeling and data compilation) studies of Principal retention and turnover behavior have been conducted. These studies are reviewed in detail below.

This informational limitation prompts the need to inquire about what should be investigated about the retention and turnover of Principals and Assistant Principals within the public school systems of Delaware. A series of important questions can be raised, some of which will be investigated in the present study:

1. What are turnover and retention rates of Principals and Assistant Principals?
2. How do the turnover and retention rates of Principals and Assistant Principals vary over time?
3. What patterns of turnover and retention behavior are manifested?
4. How do the retention and turnover of Principals and Assistant Principals vary by school levels, i.e., elementary, middle, and high school?
5. How do the retention and turnover of Principals and Assistant Principals vary by school positions, school district levels, and the characteristics of schools and districts?
6. What are the determinants or sources of variation in tenure, retention, and turnover among Principals and Assistant Principals? That is, what factors explain differences in the retention and turnover of individual Principals and Assistant Principals?
7. What are the pattern, if any, of tenure, retention, and turnover among Principals and Assistant Principals over the time of their work life in the educational field? Put differently, is there a distinct career path among Principals and Assistant Principals in which they manifest a significant pattern of retention and turnover?

8. Concomitantly, what are the relationships and connections between Principal and Assistant Principal positions as individuals engage in their career choices as educational managers and administrators?
9. How does the retention and turnover behavior of Principals and Assistant Principals in the Delaware public school system compare with the corresponding systems in other states?

As discussed more extensively in the next section, these research questions encompass multiple dimensions of the retention and turnover behavior in which Principals and Assistant Principals engage. These activities include movement among a considerable array of different jobs (turnover) as well as remaining in particular jobs for a period of time (retention) by both types of managers/administrators. Understanding of these two types of job behavior, however, requires acknowledgement that there are two interrelated ways to look at the retention and turnover of Principals and Assistant Principals. These two perspectives – a short term view and a long-run view -- drive the research questions to be addressed. The two perspectives have been identified from our own data compilation and a review of the empirical literature on Principal retention. While some previous empirical studies deal with a retention and turnover issue that is seemingly the same, they may use different perspectives to explore the issue; consequently educational officials and policy makers are provided with information/data and statistical results that answer different research questions.

The long-run or long-term perspective encompasses the *dynamic* character of the retention and turnover of Principals and Assistant Principals. This viewpoint entails a focus on the career paths that individuals realize in their administrative jobs. Individuals are tracked through time (selected period) as they assume jobs as Principals and Assistant Principals. This tracking is to ascertain the extent to which cohorts of Principals and Assistant Principals have stayed in (or retained) a particular job or moved from (or changed) jobs over a time period, (which of course is limited by the time frame of the data). More specifically, the long-term analyses focuses on separate groups of individuals who become Principals and/or Assistant Principals by determining their retention at jobs or moving among jobs over their tenure in the school system. Thus, with a data set that covers a specific time period (say 15 years), all new Principals and Assistant Principals that enter the system each year are traced separately for their retention and turnover activities. The complexity of retention and turnover could be substantial,

given the number of different jobs changes that are available to Principals and Assistant Principals manifested. Moreover, the dynamic job behavior of “new” Principals and Assistant Principals that occurs annually provides the bases of the short-term perspective

The short-term perspective provides a *static* view of retention and turnover activities. It captures a “snapshot” of Principals and Assistant Principals who remain at or move from jobs at any point in time, most commonly on annual basis. The extent of retention and turnover of Principals and Assistant Principals are determined by the number of individuals (a) who remained or were retained in the same job, and (b) who have moved from one job to another between two periods, e.g., the years 2001 and 2002, a point in time. In this situation, one can be provided a simple picture of the scope of job movement and stability that occurred from one selected period to the next. All individuals in the system, with either Principals or Assistant Principals as a focus, are delineated for their job mobility or job immobility. In other words, in this short-term perspective, multiple cohorts of either Principals or Assistant Principals who entered the public school system at different time periods are measured jointly for their retention and/or turnover behavior during the same particular time period, most commonly in a year.

III. RETENTION, TURNOVER, AND TENURE: MAJOR CONCEPTS

A review of the literature and initial exploration of our own data reveal the complexity of retention and turnover behavior of Principals and Assistant Principals that is overlooked or oversimplified in both research and policy. This complexity arises from the multiple jobs that administrators can take in career paths. Prior to examining the specific issues within Delaware, we find it important to first present the full range of leadership¹ job transitions that can and often do occur. This helps the reader to better understand the landscape of school administration as a context for considering our findings and implications for policy and practice.

A. Transition in place and role

Individuals can participate in leadership job transitions as Principals and Assistant Principals. If these individuals stay in any one job for a particular selected period of time administrative retention prevails. Conversely, turnover occurs when the individuals change or move from one job to another. Job transitions occur on two domains- the place or system

domain and the **role** domain. The place or system domain refers to where an individual works in the educational (in this study the public school) system – literally the school or district – or the absence of participation in the system – perhaps temporarily leaving, leaving prior to retirement, or retiring. Between any two years, transitions can occur across this place domain: between schools within a district, between districts, exit from the system, (re)entry into the system. The role domain refers to the role an individual plays while in the system, as a teacher, school administrator (Principal or Assistant Principal), central office administrator, and so on. Between any two years, transitions occur across the role dimension as well: from teacher to Assistant Principal, Principal to central office supervisor, and so on. While there is an implicit directionality to role movement, usually from the classroom to increasingly larger units of administrative responsibility, movement is not limited to this direction: Principals can return to teacher role, central office administrators to Principal roles, and so on.

Conceptually, between any two years an educator can experience transitions across neither, one, or both domains. For example, a Principal may stay in the same role and school from year 1 to year 2, or that Principal may stay in the same role but move from one school to another, stay in the same school but change roles (e.g., Assistant Principal to Principal), move from a Principal position to out of the system, or change both role (e.g., Assistant Principal to Principal) and district. This creates an enormously complex array of possibilities in any given year for a single individual. Multiplied by the number of educators, especially in a large state-wide public school system such as California, the combinations can be very numerous.

Consider the following table as a set of transitions between any two years:

¹In the educational literature, the jobs of Principals and Assistant Principals are associated with the term “leadership”; in labor economics, the jobs of Principals and Assistant Principals are viewed as assuming occupational category of administrators or managers without reference or assumption of leadership.

Table III-1. ROLE AND PLACE CHANGE

| | School | | District | System | |
|---|----------------------------------|---|--|---------------------------------|-------------------------------------|
| | NO PLACE CHANGE | | PLACE CHANGE | | |
| Teacher <i>NO ROLECHANGE</i> | Stay teacher in same school | Stay teacher in different school | Stay teacher in different district | Leaves system as a teacher | Returns to system as teacher |
| | Move to AP in same school | Move to AP in different school | Move to AP in different district | | Returns to system as AP |
| | Move to Principal in same school | Moved to Principal in different school | Move to Principal in different district | | Returns to system as Principal |
| | | Move to central office same district | Move to central office in different district | | Returns to system as central office |
| Assistant Principal <i>NO ROLE CHANGE</i> | Stay AP in same school | Stay AP in different school | Stay AP in different district | Leaves system as AP | Returns to system as AP |
| | Move to teacher in same school | Move to teacher in different school | Move to teacher in different district | | Returns to system as teacher |
| | Move to Principal in same school | Moved to Principal in different school | Move to Principal in different district | | Returns to system as Principal |
| | | Move to central office in same district | Move to central office in different district | | Returns to system as central office |
| Principal <i>NO ROLECHANGE</i> | Stay Principal in same school | Stay Principal in different school | Stay Principal in different district | Leaves system as a Principal | Returns to system as Principal |
| | Move to AP in same school | Move to AP in different school | Move to AP in different district | | Returns to system as AP |
| | Move to teacher in same school | Moved to teacher in different school | Move to teacher in different district | | Returns to system as teacher |
| | | Move to central office in same district | Move to central office in different district | | Returns to system as central office |
| Central Office <i>NO ROLE CHANGE</i> | Stay central office in district | | Stay central office in different district | Leaves system as central office | Returns to system as central office |
| | | Move to Principal in different school | Move to Principal in different district | | Returns to system as Principal |
| | | Move to AP in different school | Move to AP in different district | | Returns to system as AP |
| | | Move to teacher in different school | Move to teacher in different district | | Returns to system as teacher |

When considering the careers of school leaders, each of these intersections may be important and worth examining, but it will depend on the purpose. For example, an investigation of factors influencing early exit from school leadership could focus on those who leave Assistant Principal and Principal jobs prior to retirement. Inquiry into the attractiveness of or the pipeline to Principalship could focus on transitions (and the absence of) between Principal and Assistant Principal roles, irrespective of schools. A district administrator may want to better understand whether they are retaining effective administrators or exporting them to other districts.

While each transition may be important, there are important underlying issues that must be recognized when analyzing and interpreting mobility patterns. First is the issue of **opportunity**. Transitions across both the role and place dimensions may be a function of available opportunity. For districts with one high school, Assistant Principals seeking a Principalship at that level may either leave the district or remain in the Assistant Principal role for longer than in other districts due to constraints on available opportunities. Conversely, a wave of retirements may result in new and unexpected opportunities for educators across the system.

A second issue is **choice**. Models of turnover and mobility often assume that individuals have preferences and make decisions based on those preferences – for example, to move to a higher performing school or to a better-paying district (e.g. Loeb, et al, 2010; Papa, 2007). Referring to the table above, there are many instances where an individual may have choice in their career path and many situations where they may not. For example, a new superintendent or school board may involuntarily shuffle administrators with or without any sort of change in opportunity structure or application process. On the other hand, movement to another district is generally by choice (the choice to apply to that position) though exit from the previous district may not be by choice (i.e. non-renewal of contract).

The issues of opportunity and choice are not only substantively significant for developing policy and practices that facilitate recruitment, support, distribution, and retention of effective school leaders, but they are also methodologically significant. As discussed in more detail below, in statistical analyses of leadership retention and mobility, regression equations are utilized to explain an outcome or outcomes of interest (the dependent variable), -- e.g. movement to a new school by Principals and and/or Assistant Principals, and movement from Assistant Principal to Principal in the same district, -- with a set of determinant (or independent or

predictor variables). If the role of opportunity and/or choice is considered to be a context under which mobility occurs, then the statistical analyses should make clear that either opportunity or choice or both occur in the mobility and retention behavior. In this respect there are statistical concern: (a) can the issues/activities of opportunity and choice be identified, (b) are the frequency of the manifestation of either issue sufficient to warrant incorporation into a regression model, and (c) how would the designation of choice or opportunity be measured as a predictor variable. In appraising findings from this and other studies, we want to be sure that the outcomes of interest have substantive significance and are narrow enough to be meaningful in the understanding of why transitions occur.

B. Defining the terms

With any inquiry of retention, turnover, and tenure, it is important to have clarity with respect to the meaning or definitions of these three terms that pertain to job behavior. In the professional literature on workforce activities, when retention is used singularly, turnover is implicit in the context of the discussion since it is the obverse of retention. Retention delineates individuals who stay in their current job (and thus retained by their employer). Turnover encompasses the mobility of individuals in their job actions, specifically to indicate individuals' movement from their current job. In labor economics literature, both turnover and (job) separation or separations have similar meaning that indicates that individuals are departing or have departed from their current jobs. Tenure is designated as the length of time, say in years, that individuals remain at their job, i.e., it is the time frame that they engage and thus are retained in their job.

How these three concepts of retention, turnover, and tenure are applied depends on the way in which a job is defined. As described above and displayed in Table III-1, a job can entail participation separately at a place, in a role, and involve a combination of both place and role. One can determine the retention, turnover, and tenure of individuals according to their time and movement/non-movement from either a school, or a district, or the Delaware public school system. For example, with respect to place, for Principal who has made several moves over 20 years as a Principal, the tenure of a Principal can be delineated separately for (a) five years at school A, seven years at School B, and eight years, at School C; and/or (b) 12 years in district 1 and eight years in district 4, or (c) 20 years in the Delaware public school system. Likewise, regarding the role domain, retention, turnover, and tenure can defined for an individual as a

teacher, a Principal, an Assistant Principal, or a central office administrator, and so on. One can also determine the length of time an individual remains in any of the listed roles until their departure to another role. Moreover, transitions and thus tenure, retention, and turnover can be demarcated for the joint place and role for which individuals hold a job in the school system. For instance, a person could have served continuously over 20 years as a Principal but with different time frames (tenure) across several schools and/or districts. In sum, how the concepts of tenure, retention, and turnover are applied for the various classes of jobs occurring within places to fulfill various roles depends on the purpose of research and/or policy analysis. What follows is the numerous classes of job activity that represent the transitions that individuals can pursue as managers and administrators within the public school system, and for which retention, turnover, and tenure can be determined.

Borrowing from the teacher retention literature, we can describe administrators experiencing career transitions as: stayers, movers, changers, leavers, (Johnson and Birkland, 2003; Johnson et al., 2004; Luekens et al., 2004),² spellers, retirees, and hires. These categories or forms of mobility are arguably more complex than found in the literature on teacher retention: there is no explicit career ladder or hierarchy for teachers, whereas in school administration a career ladder is more explicit from Assistant Principal and Principal, as well as administrative positions in the district central office. Additionally, due to increasingly stringent certification requirements, teacher mobility is not often between school levels (elementary, middle, high school), in contrast to administration where there is more fluidity between school levels. As a result, the categories derived from teacher retention studies underestimate the complexity of administrator mobility.

Numerous concepts are employed in the analysis of the retention of public school Principals and Assistant Principals in Delaware. Some of the same concepts have different nomenclature across the disciplines that study demand and supply of Principal and Assistant Principals. Immediately below we provide some clarification of the concepts that are used throughout the report, so that there is a common interpretation of the present analysis. Other concepts will be introduced and defined as needed.

In our discussion and analysis, we refer to administrators between any two years in the following ways:

² These terms are borrowed from the literature of teacher retention.

State of Delaware System: The state of Delaware system refers to the public schools within public school districts and all charter schools that are financed and regulated by the state government of Delaware.

Principals and Assistant Principals: Individuals are identified as full-time employees holding an administration position of a Principal or an Assistant Principal according to the DOE data set.

Tenure: When used in this report, consistent with the literature of labor economics, tenure refers to the length of employment in a particular position (role and place) and not the obtainment of job “security”, unless otherwise indicated. The measurement of tenure applies separately to the position of Principal and Assistant Principal within the state of Delaware. Tenure is the extent of the job longevity that an individual has had as a public school Principal. Likewise, tenure is the job longevity of a person in the position as a public school Assistant Principal within the state of Delaware. That is, tenure the cumulative amount of time (in years) that an individual was active as a Principal or as an Assistant Principal in any school district in the state of Delaware, irrespective of whether they have had continuous annual employment over time or had periodic employment (spells) over a span of years. For example, a Principal would have a tenure of ten years between the period of 1991 and 2004, if he/she was hired in 1991 and stayed until 1993 (two school years), then went on leave in 1994 and 1995 for child bearing and care (no years counted), and thereafter returned in 1996 only to retire in 2004 (eight school years).

Turnover: Turnover is a general term for the departure of Principals or Assistant Principals from their administrative jobs either as leavers, movers, or retirees (Ingersoll 2001, p. 500).

Attrition: Attrition refers to Principals or Assistant Principals leaving the administrative profession (Ingersoll, 2001).

Separations: Separations encompass public school Principals or Assistant Principals who leave voluntarily (i.e., quits/resigns/retires) or are terminated (leaves involuntarily, i.e., fired) by a school district. Separations include movers, leavers, and retirees.

Retention: Retention represents the decisions that have been made by either the school district administration or a Principal and Assistant Principal about the continuation of, or separation from, employment in their present position as a public school Principal or as an Assistant Principal after a period of (short or long) tenure.

There are numerous categories of job positions that are indicative of various dimensions of retention --stayers, movers, changers, leavers, (Johanson and Birkland, 2003; Johnson et al., 2004; Luekens et al., 2004),³ spellers, retirees, and hires. These categories are not mutually exclusive; individuals can be subsumed under more than one category in a given time period. Not every job position retention category is employed in the present study, but the positions do indicate the range of complexity in the retention outcomes. The use of any of the job categories depends on the purpose of a particular study.

- **Stayers**: Stayers are Principals or Assistant Principals who remain in the same positions for consecutive years. These individuals can be easily tracked with the data of the Delaware school system.
- **Movers**: Movers (sometimes referred to as migrants) are Principals or Assistant Principals who moved to the same administrative positions from one school within a district or from one school district to another district within the state of Delaware. These individuals can be easily tracked with the data of the Delaware school system. Movers are coded as such by determining that an individual Principal or Assistant Principal has obtained employment in a school or a school district different than that of the prior school year. There are several categories of movers:
 - **Within-Movers – Principals**: Principals who moved from one school to another within a school district.
 - **Out-Movers** – Principals: Principals who moved from one school district to another district within the state of Delaware.
 - **Within Movers – Assistant Principals**: Assistant Principals who moved from one school to another within a school district.
 - **Out Movers – Assistant Principals**: Assistant Principals who moved from one school district to another district within the state of Delaware.
 - **Movers To Levels Within – Principals**: s who moved from one school level to another school level within a school district.
 - **Movers To Levels Out – Principals**: Principals who moved from one school level in a district to another school level in another district within the state of Delaware.

³ These terms are borrowed from the literature of teacher retention.

- **Movers To Levels Within – Assistant Principals:** Assistant Principals who moved from one school level to another school level within a school district.
- **Movers To Levels Out – Assistant Principals:** Assistant Principals who moved from one school level in a district to another school level in another district within the state of Delaware.
- **Changers:** Changers are Principals or Assistant Principals who either moved from one administrative position to another, or left their administrative position to return to teaching within the State of Delaware. There are several categories of changers:
 - **Changers - Principals:** Individuals who were Assistant Principals and became Principals.
 - **Changers – Assistant Principals:** Individuals who were Principals and became Assistant Principals.
 - **Changers - Teaching Principals:** Individuals who were Principals and returned to a teaching position.
 - **Changers – Teaching Assistant Principals:** Individuals who were Assistant Principals and returned to a teaching position.
 - **Changers - Administration Principals:** Individuals who were Principals and moved to a central administration position.
 - **Changers – Administration Assistant Principals:** Individuals who were Assistant Principals and returned to a central administration position.
 - **Changers – Teacher to Principal:** Individuals who were teachers and became a Principal.
 - **Changers – Teacher to Assistant Principal:** Individuals who were teachers and became an Assistant Principal.
- **Leavers:** Leavers are Principals or Assistant Principals who left their administrative position in any school or school district within the state of Delaware and did not have subsequent employment in any other school within the state system. These leavers may be individuals retiring or non-retirees (individuals not of retirement age).
 - **Leavers: Principal Non-Retirees:** Leavers: Non-Retirees are Principals who left their administrative position in any school or school district within the state of Delaware system and did not have subsequent employment in any other school within

the state system. However, it is unclear whether these leavers migrated to private schools, took an educational job in another state, left the education profession, or left the job market.

- **Leavers: Assistant Principal Non-Retirees:** Leavers: Non-Retirees are Assistant Principals who left their administrative position in any school or school district within the state of Delaware system and did not have subsequent employment in any other school within the state system. However, it is unclear whether these leavers migrated to private schools, took an educational job in another state, left the education profession, or left the job market.
- **Leavers: Principal Retirees:** Leavers: Retirees are Principals who have retired from their job as a public school Principal or Assistant Principal. They have been identified as individuals who left the Delaware educational system and were eligible to receive their pension after 30 years of service or individuals that left who were at the retirement age of 65 years or older.
- **Leavers: Assistant Principal Retirees:** Leavers: Retirees are Assistant Principals who have retired from their job as public school Principal or Assistant Principal. They have been identified as individuals who left the Delaware educational system and were eligible to receive their pension after 30 years of service or individuals that left who were at the retirement age of 65 years or older.
- **Spellers:** Spellers are public school Principals or Assistant Principals who have undertaken a hiatus (or spell) from their administration position in the Delaware school system. They are individuals who left their administration position after a school year but returned to an administration position in subsequent years. These individuals were tracked in the DOE data set through their identification number. Spellers are counted as “new” Principals or Assistant Principals in the beginning of the school year.
- **Newly hired:** Newly hired are Principals or Assistant Principals who have made their first entrance into any public school district within the State system. They are counted as “new” Principals or Assistant Principals in the beginning of the school year. There are several categories of newly hired:
 - **New to Administration – Principals:** Individuals who are first-time Principals who were teachers or Assistant Principals in the State of Delaware.

- **Returning Spellers – Principals:** Individuals who left a public school administrative position in Delaware but have returned as Principal either to the school that they left or to another public school within the state of Delaware.
- **New to Delaware but not new Principals:** Individuals who have been in education administration in another state.
- **New to Administration - Assistant Principals:** Individuals who are first-time Assistant Principals who were teachers in the State of Delaware.
- **Returning Spellers - Assistant Principals:** Individuals who left a public school administrative position in Delaware but have returned as an Assistant Principal either to the school that they left or to another public school within the state of Delaware.
- **New to Delaware but not new Assistant Principals:** Individuals who have been in education administration in another state.

As evident in Table III-I above, these categories are not always mutually exclusive. For example, someone may be a changer and a mover – moving from one role in a school to a different role in a different school. The definitions and labels offered here reflect that complexity but offer simplified terms for discussion and analysis purposes.

Indeed this discussion has revealed a high degree of complexity possible in the careers of school leaders, including role and place changes occurring both within and out of the Delaware education system. While we believe that all of these types of transitions may be conceptually important, we must consider which of these transitions are empirically meaningful – that is, in the Delaware system, which transitions occur often enough to warrant attention in policy and practice? Given the size of the Delaware system in comparison to other systems in the country, we expect that only some of these transitions are empirically meaningful in this context, but that a broader range of transitions may be evident in larger and different system contexts.

IV. REVIEW OF RETENTION AND TURNOVER STUDIES

Within the past decade there has been much public commentary by government official, educational interest groups, and educators about the retention and turnover of school administrators especially Superintendents and Principals. This commentary has generally expressed concern over the potential departure of these classes of administrators as well as the limited pool of qualified candidates who are willing to replace departing administrators, and even a lack of willingness among potentially qualified individuals to assume the administrative positions. As stated above, commentators are apprehensive about the link between the positive performance of schools and extent of retention and turnover, for which there is limited evidence. Much about the extent of a turnover problem and its negative impacts has been based on anecdotal information and seemingly casual analysis and conjecture; in effect there is not much empirical evidence about the prevalence of either retention or turnover and the reasons for their occurrence.

A total of six published articles and reports were found. Of these studies, only one analysis has focused on retention and turnover both Principals and Assistant Principals. With this study, just a data profile is presented. None of the reviewed studies makes a clear distinction that retention and turnover can be viewed from two perspectives; in fact several studies provide a limited data profile based on one perspective and then conduct statistical modeling of data that measures the second perspective. The present review will address whether or not the two perspectives have been considered in the past studies. Given the small number of studies, we will review each of them individually.

A. Fuller and Young (2009)

Fuller and Young (2009) approached the retention and turnover of Principals from the dynamic perspective of their career path movements. The authors determined the tenure and retention of newly-hired Principals in the State of Texas public school system with data covering the period of 1995 through 2008. Tenure was defined as the length of time a Principal stayed in his/her position at the same school (place). Retention rates were calculated as the proportion of newly-hired cohort of Principals who remained at their initial assigned school. Newly-hired Principals were identified by ascertaining that a Principal in a particular school in a given year

was the same or a different individual in the following year. Moreover, the observations do not include first time Principals, but only those who are new to a school.

The analysis was conducted with two data sets from Texas Education Agency. A purchased data set included the personal characteristics of each Principal: race/ethnicity, age, gender, and state Principal certification test score. Data of school characteristics were downloaded from the agency website: (a) student demographics; (b) school size; (c) student achievement on the Texas Assessment of Knowledge and Skills (TAKS); (d) School level; (e) accountability rating; and, (f) geographic location of the school employing the Principal.

Both tenure and retention rates were determined by separate tracking of the school movements of four cohorts through ten year periods. The separate cohorts were signified as Principals who began service in a school in 1996, 1997, 1998, and 1999. A subsequent analysis focused on frequency counts of tenure and retention outcomes which were arranged according separately to each personal characteristics and school characteristics.

The overall statewide tenure for newly-hired Principals was affirmed to be 4.47 years for the initial school assignment with a range between 3.71 years and 4.99 years. Fuller and Young concluded that difference in tenure prevailed without assessing for statistically significance.

Statewide retention rates were concluded to be “strikingly low for all schools”; slightly more than 50% of newly hired Principals stayed for three years and less than 30% stayed for five years. Seven empirical findings were drawn from the personal and school characteristics comparison of retention rates and tenure. However, tests of statistical significance were not employed to confirm the asserted bivariate relationships. Moreover, in the discussion section, conclusions made about accountability, complexity and intensity of a Principal’s job, lack of support from central offices, and compensation. It is questionable that such statements can be inferred from the personal and school variables used in the study.

B. Partlow (2007)

In 2007, Partlow evaluated the impact of “contextual” factors on the turnover of only elementary school Principals. A proportional stratified random sample of 109 (68 urban, 26 suburban, and 15 rural) schools was drawn from south west Ohio for the years 1997 through 2003. The research question was how accurately contextual variables (school building and school district characteristics) predict average Principal turnover frequency. Without explanation or assessment, the analysis is conducted under the acknowledged assumption that

effective Principals who remain at their positions in five years results in higher student achievement, and contextual factors can be identified for their contribution to Principals' longevity and thus their effectiveness. In effect, by measuring this dependent variable as "the number of Principals at a (school) building site over the study (seven) years", a static approach to explaining retention is taken, i.e., retention and turnover are depicted at a particular point in time, viz, annually. Eight contextual variables were chosen for analysis: turnover rates in superintendent positions, school building enrollment, student attendance rate, student mobility, pupil-teacher ratio, teacher attendance, student achievement in reading, and student achievement in mathematics. Applying an ordinary least squares (OLS) equation, only student achievement in mathematics was found to be expectedly negatively related to turnover frequency, -- i.e., schools with higher achievers had less turnover of elementary Principals.

Partlow's study is a very limited analysis of Principal retention. First, the sample frame leaves open the question how representative is the data of elementary Principals elsewhere, which is indicated by the author's own disclaimer that the findings cannot be generalized beyond the chosen selected group. Second, the turnover frequency measure may not accurately capture the actual stability at school building sites since it ignores when a Principal entered the building site prior to the seven year time frame and how long a Principal stayed after the time frame of the study. This criticism indicates that the dependent variable is censored with some individuals not manifesting the outcome due to the truncation of the time period of analysis; thus a different estimator such as survival analysis should have been employed, and not OLS. Third, irrespective of accuracy of turnover frequency measured or its interpretation, this dependent variable resulted in a limited range of value (1 to 4, and means varying 2.44 from 1.77 for all school type). Although defined in the study as a continuous variable, the limited variation of turnover frequency points to a case of a limited dependent variable, for which OLS is inappropriate because it would produce estimated biased coefficients. Fourth, it is unclear whether the contextual variables were measured at the district and school levels. The fifth and six points are highly related. Fifth, the independent contextual variables of the statistical analysis pose problems. It is quite appropriate to assess a regression equation for multicollinearity. However, there are more accurate diagnostic techniques readily available and widely employed. Having eight initial (contextual) variables should not be considered as being large number (with only five entered into the equation due to collinearity). This view is

inconsistent with other determinants of retention studies that employ a greater number of independent variables. The number of variables involves the choice of appropriate kinds and number of (school and school district characteristics) determinants, i.e., specification of independent variables that have theoretical predicted impacts on retention. This concern leads to issue of the omission of relevant variables from the right hand side of the equation; if they are omitted, variables that are correlated to some extent but also contribute to the explanation retention behavior result in estimating biased coefficients. Sixth, the use of the stepwise regression procedure to predict turnover is also problematic. The stepwise regression procedure is an inductive search method, indicating a lack of theory or grounded hypotheses, and the estimates derived from the procedure varies according to the number and types of variables and sample size employed in the initial equation.

C. Gates, et al. (2006)

In a 2006 publication, Gates and colleagues (2006) provided their evaluation of the retention of first time Principals in the states of Illinois and North Carolina. In this dynamic approach to turnover, they assessed the trajectories (career path) of Principal transitions after the assumption of Principalship. Since no previous studies of Principal retentions were found, the researchers relied mainly on teacher retention studies as a guide to analyses. A longitudinal event history modeling approach was conducted to determine whether individual and school characteristics of the Principals were related to different dimensions of their turnover and mobility. The research objective employed administrative data of all individuals employed in Principal positions from two states covering the school years 1987–1988 to 2000–2001.⁴

Similar to but not as extensive our analysis above, Gates et al classified mobility/turnover possibilities into nine different categories: (1) Principal in the same school, (2) Principal in a different school in the same district, (3) Principal in a different school in a different district, (4) other administrative position in the same district, (5) other administrative position in a different district, (6) teacher in the same district, (7) teacher in a different district, (8) other, and (9) left the state system. However, Gates limited the statistical investigation to whether individual- and

⁴ The administrative data for Illinois was based on an analysis of Teacher Service Record and Teacher Certification data provided by the Illinois State Board of Education (ISBE). The North Carolina data was based on the Education File and the Payroll File, provided by the North Carolina State Department of Public Instruction (DPI).

school-level variables⁵ affect the probability of four possible outcomes. Principals remaining at the same school (known as the reference or reference case) were compared separately with Principals who (a) remained a Principal, but changed schools, (b) left the Principalship for another job within the system, and (c) left the state public school system. To assess these outcomes, the longitudinal event history modeling approach encompassed a discrete time competing risk model that was implemented by estimating a multinomial logit model.⁶ The basis of this modeling is that the data on Principals is right censored, i.e., many Principals remain as observations in the time frame covered by the data set, and thus never make transition of leaving their (initial) position while other did so (and are uncensored). Such data require the application of a maximum likelihood estimator (MLE). The estimation utilized data observations of job years (i.e., counting a Principal as a data point/observation for each year he/she remained in the years encompassed the data set).

The descriptive analysis over the six years of the data revealed considerable stability in the retention of Principals. Over six data years respectively in Illinois and North Carolina, 85.8% and 83.1% of all first time Principals remained in their current position. Conversely, the turnover among all school first time Principals was 14.2 % in Illinois and 17.9% in North Carolina. In both states a large proportion of Principals' turnover involved changing schools, with 7.1% of first time Principals in Illinois (or 50% of all turnovers) and 10.2% of first time Principals in North Carolina (or 57% of all turnover) switching schools, but remaining as Principals in the state public educational system. The turnover rates for first time Principals attributed to "leaving the Principalship, but remaining in the state system" was 4.7 % in Illinois (or 33% of all turnover) and 4.8 % in North Carolina (or 27% of all turnover). Moreover, 2.4% of first time Principals in Illinois (or 17% of all turnovers) and 1.9% of first time Principals in North Carolina (or 11% of all turnovers) were found to have dropped out of the state system. Gates also concluded that the data indicates, after 6 years of holding first Principalship, "greater

⁵ Individual characteristics: Employee's age, the centered square of the age, Employee is female, Employee is black, Employee is Hispanic, Employee is of another race, Undergraduate degree from institution ranked "most competitive", undergraduate degree from institution ranked "non-competitive", Master's degree, Ph.D., Years of experience;

School characteristics: Number of students enrolled, Percent minority students, Employee is the same race as that of the majority of students, Middle school, High school, Combined school, Urban school in the Chicago area, Suburban school in the Chicago area, Urban area other than Chicago Suburban area other than Chicago, Urban, Suburban, County wealth rank.

⁶ The separate modeling of both North Carolina and Illinois data support the assumption of the independence of irrelevant alternative (IIA). The regression models would produce reliable results if the relative probability of any two outcomes is not altered by inclusion or exclusion of other possible outcomes (categories of the dependent variable). The Hausman and McFadden test of IIA verified the validity of the IIA assumption that dropping one category from the model should not change the estimated coefficients of the competing risk models.

degree of retention stability in Illinois than North Carolina” with 60% and 55% respectively in Illinois and North Carolina still holding Principal positions in their state.

The statistical models also support high degree of Principal stability, but findings indicate that school characteristics contribute to have lower levels of retention stability. First, Principals in larger schools are less likely to take on a Principalship in another school, to leave their current Principalship to move another position in the school system, and to leave the state system. Consequently Gates states that “overall, larger schools have lower Principal turnover indicating that larger schools are not facing particular challenges in retaining Principals”. Second, Principals in schools with a larger proportion of minority students were found to be more likely to change schools and to leave the Principalship, but remain in the state system. That is, Gates concludes in general since overall schools with higher proportions of minority students have higher turnover, that such schools may have a harder time retaining Principals. However, in Illinois, Principals of the same race as largest racial group within a school are less likely leave for another position. The implication drawn from this finding is that retention can be facilitated by hiring minority Principals for minority dominated schools. In Illinois, Principalship career path of females may have different than that of males. Females are more likely to drop out of the state system and to change positions than men, but similar in their behavior as men to change schools. This behavior pattern increases with the age of female Principals, as shown by the statistically significant interaction term of gender (female) and age.

D. Papa (2007)

In what appears to be a “quasi” dynamic approach to turnover, Papa (2007) evaluated the retention of newly-hired (not first time) Principals in the state of New York. The career paths of these newly hired Principals were assessed after they assumed their initial (first-time) Principalship. Two separate conditional logit (regression) models (discussed below) were applied separately to investigate the bases of two retention outcomes: within (school) district turnover, and interdistrict (school) turnover. The research was undertaken with two administrative datasets obtained from the New York State Education Department that included each individual employed in Principal positions in the state during the school years 1991 to 1999.

As stated above, Papa specified two conditional logit models for two separate outcomes which were to verify the determinants of Principal succession: within (school) district turnover, and interdistrict (school) turnover. The conceptual underpinning of the conditional logit model is

formulated on the bases is that Principals movement is a latent variable in which utility manifested. Principals will leave a school and go to another school if such a move is expected to bring greater satisfaction to Principal, and a school administration will hire a “new” Principal if they expect better outcomes than could be achieved by existing Principals. Where a Principal remains and thus is retained, there is a good match between Principal and their current school because both a Principal and school administration obtains the choice they want. Put differently, no higher utility can be gained so there is no incentive for firing a Principal or for a Principal to move. However, given that retention is viewed as a positive outcome, there are some instances in which lack of retention is not necessarily a negative outcome, and these actions are eliminated from analyses: (1) Principal moves into a different interim position within same district and then returns to initial position, (b) Principal leaves system, e.g., retirement, and (c) Principal moves to another district and leave Principalship.

“Retention” is defined as “positive” for those Principals who have remained in their position for a long period with the duration of time being four years based on the average stay in positions among Principals in the data set. (Only first move is counted for any Principal). Because retention is considered a positive outcome, specifying a set of independent variables on the right hand side of the conditional logit models will allow assessment of what are the determinants of retention, and thus what factors result in attracting Principals away from their current school.⁷ Since a Principal can only move, and thereby potentially increase their utility, if alternative schools are available, a number of variables were included that indicate an available set of schools that had an open Principalship in the three years after a Principal assumed their position at a school. For the within district analysis, these additional independent variables pertained to the same grade school level (e.g., Middle school) of a Principal’s current school assignment if the Principal moved to the same grade school level. If Principals moved to a different school level than their current ones, then variables of the available set of schools included both original school level as well the all school levels within a district. Where a Principal moved to a school outside his current district, a set of variables was compiled separately for schools within a Principal’s own region of their current district and for the outside

⁷ Principal-level Measures: Gender, Less than 45 years old at hire, Veteran Principal, Outsider (of district), Less than 5 years of district experience, More than master’s degree.
School-level Measures: Salary (thousands), Number of students enrolled (hundreds), Nonwhite students (pct), Students with limited English proficiency -- LEP (pct.), Uncertified teachers (pct.).

region of his chosen district (an interdistrict analysis)⁸ with the geographic regions defined by the Metropolitan Statistical Areas (i.e., urban and surrounding suburban areas. The actual measurement of the alternative school variables, --referred to as Adjustment of Aggregation, -- were computed as the average number of schools and variance of several separate variables (within the selected district or the outside districts for the interdistrict analysis): average number of alternative schools, variance of salary, variance of student enrollments, variance of nonwhite students, variance of students with limited English proficiency (LEP), and variance of uncertified teachers.

The descriptive analysis over the nine years of the data revealed only moderate stability in the retention of newly-appointed Principals. The mobility status of all newly-appointed Principals were compiled over the nine year time frame of available data, with retention defined as a Principal remaining and/or retained for at least four years consecutively at the same school over that time frame. Thus the following figures indicate the Principals' mobility activity across the New York State public school system. The percentage of all newly-appointed Principals who remained at the same school was 51.8% (46.4% as Principals, 5.4% in other positions); 14.5% of all newly-appointed Principals moved to different schools within the school same district (7.9% as Principals and 6.6% in other positions); 11.6% moved to different schools in different districts (7.1% as Principals, and 4.5% in other positions); 22.1% left the system.

The statistical analyses of the interdistrict and within Principal retention and movements produced had three common determinants, but former realized several more statistically significant findings. For the interdistrict analyses, the following variables were found to be statistically significant, indicating with greater odds of retention (four year commitment to the same school), in which case, Principals' generated more utility for themselves by remaining at the same school than alternatives placement outside their current districts:(1) more than five years experience as a Principal, (2) higher salary, (3) the fewer number of students enrolled, (4) higher percentage of white students, (5) lower percentage of students with limited English performance, and (6) less variance of uncertified teachers. The within district analysis also confirmed that (1) higher salary (2) a greater percentage of white students, and (3) less variance

⁸ For the interdistrict analysis, because the labor market for Principals was somewhat localized and because there was no measure of distance between the locations of schools, it was considered difficult to characterize the set of schools that is available to a rural Principal. As such, rural Principals are dropped from the analysis (approximately 23 percent of the Principals in the original population). For the interdistrict analysis, the set of available schools is limited to nonurban schools because only three Principals moved to an urban district school; so the three Principals are dropped from the analysis.

of uncertified teachers was associated with greater odds to stay at the same school within a district rather than move to another school within that district.

Several questions arise about the Papa analysis. First, even though four years are the average duration of Principalship retention, why is it chosen instead of any alternative measure? Second, to what extent does distortion occur in the reference category when there are individuals with three years in the same school recorded in the last three years of data? Could these individuals be retained Principals manifesting the characteristics of those individuals with four years of service? Third, are the alternative available schools appropriate for the within district analysis, given that Principals who are intent on moving could have looked at moving outside the district but merely found a better offer (more satisfaction) inside the district.

E. Loeb, Kalogrides, and Horng (2010)

In a 2010 article, Loeb, Kalogrides, and Horng (2010) presented an evaluation of the retention of all (inclusive of current as well as first time, and non-first time newly-appointed) Principals in the very large school district of Miami Dade County. In this static approach to turnover, they assessed the distribution of Principal across the county school system with a twofold research focus. A longitudinal modeling approach was conducted; this analysis entailed applying competing risk models (referred to as time discrete hazard models) to verify the determinants of various Principals' retention decisions (clarified below). The second research activity involved analyzing a survey of Principals to ascertain the extent to which Principals' job perspectives were constituent with the findings of the competing risk models. The investigation utilized administrative data of all individuals employed in Principal positions, -- 552 unique individuals who held position in 373 schools, -- covering the six school years 2003 -2004 to 2008-2009.⁹

Loeb, Kalogrides, and Horng utilized four retention and turnover Principals, decision to form three dependent variables for their competing risk models: (1) whether over the six year period that a Principal ever left the school assignment versus stayed at the school, (2) Principals leave their assigned school and never serve as Principals within the district during the time frame of analysis versus stayed at their schools (attrition), and (3) Principals transfer to another school

⁹ The administrative data for staff and students was taken from the Miami-Dade County Public Schools (MDCPS) data base.

as Principals within the district versus stayed at their schools (transfer). The data did not allow for determination of inter-district moves or the extent to which attrition is due to retirement and leaving the system for a Principalship outside of the system.

These separate outcomes were assessed by estimating the discrete time competing risk equations with a multinomial logit estimator. The units of observations were individual Principals who fit the dependent variable definition, and utilized data observations of job years (i.e., counting a Principal as a data point/observation for each year he/she remained in the years encompassed the data set). The independent variables in each equation included both fixed individual characteristics (race, gender, highest degree earned) and time varying factors (years of experience in the district and age), and the Principals' school characteristics measure in first and fourth quartiles (percentage of student with free or reduced price lunch, percentage of minority students, percentage low achievers in math, percentage low achievers in reading, and accountability grades).

The descriptive analysis of the data indicated a high level of stability in the retention of Principals. Over six data years 81% of all Principals served as Principal in only one school. The statistical models reveal common finding for the equations measuring (a) Principals leaving their assigned school, and (b) Principals leaving their assigned school and not serving as Principal thereafter. These movements were associated with schools having a higher percentage of minority students, a greater percentage of low achievers in math, a greater percentage of low achievers in reading, and poorer level of accountability grades. The survey conducted for Principals' working conditions supported these findings in which Principals indicated they preferred favorable working conditions that were associated with schools that had fewer minorities and fewer low achieving students.

F. Baker, Punswick, and Belt, (2010)

In 2010 Baker, Punswick, and Belt, (2010) published an evaluation of Principal stability and turnover in the state of Missouri. The study of stability is a static approach to inquire into the bases of Principals' length of tenure in particular schools relative to the time frame of the data set. This behavior was appraised by truncated regression models. The turnover study is a dynamic approach to retention. Statistical modeling was employed to determine the reasons for newly appointed (but not first time) Principals' decisions to move to other schools or to depart from Principalship. A longitudinal event history modeling approach in the form of the Cox

Proportional hazard models was tested to verify the impact of individual and school characteristics of the Principals' turnover and mobility. To undertake the research objectives, data on Principals and school characteristics were obtained from the Missouri Department of Elementary and Secondary Education (DESE). The data for the Principal stability study covered the seven years of 1999 to 2006. Data for the analyses of Principals' turnover encompassed three cohorts of Principal chosen from school years of 1999, 2000, and 2001.

The determinants of Principal stability was investigated with stability measured as stability ratios which were calculated as the number of years that a Principal was assigned to a given school as a percentage of the time that the Principal was in the data set. Alternative measures of stability were also tested consistent with the scale of measurement of the alternative stability measures as dependent variable: length of stay (time in years) in any specific school. (This analysis employed Poisson regressions with truncated distributions for count data of years in a position). A truncated regression model was estimated because many Principals in data set have stability ratio of 1.0. (This means that many Principals spent their time in one school when they were in the data set). Separate logit equations were also run to obtain odds ratios for the independent variables: (a) an equation for Principals with stability ratios $> .9$, which indicates high stability, and (b) an equation for Principals with stability ratios $< .333$, which indicates less stability. Fixed effects (dummy variables for year and for the number of years a Principal was in data set) were introduced to account for the fact that larger shares of Principals in the data set had fewer years of assignment at a given school (length of Principals' stay) in the beginning and end of seven year panel data.

The independent variables were the same for both types of models. First, relative salary based on difference in actual and predicted salaries which is derived from a regression of all Principals' salaries for each Missouri market. The salary ratio was calculated as the ratio of each Principal's actual salary to his/her predicted salary based on a Principal's Missouri labor market, experience, and degree level. The other variables were: Principals' school level (primary, middle and secondary, the relative size of school (enrolment compared to average enrolment for same grade level), racial and ethnic composition of students (% Black, % Hispanic), Principals' gender, race, college degree, type of academic institution and experience (although it is unclear how this variable was measured).

Over the seven year period of the data set, the number of Principals in Missouri ranged between 2,500 and 2,700 per year, and these Principals manifest a moderate to high degree of stability. The average stability of all Principals over seven years was 65 %; 65% of all Principals remained in single school. The stability was lower in middle schools with 56% of all Principals staying at the same school, and higher in high schools with 68% of all Principals staying at the same school. The most consistent finding across the truncated regression and the logit equations is the positive effect of relative salary and total experience; Principals with salary higher than peers manifested more stability, and Principals with more total experience (log) had greater stability.

Baker and colleagues focused the turnover statistical investigation on whether individual and school-level variables affected the probability of three outcomes relative to Principals remaining in the same school (known as the reference or reference case): (a) first move another school (b) Principals made their second move another school and left the state public school system, and (c) Principals exited data set. To assess these outcomes, the longitudinal event history modeling was implemented by estimating a Cox proportional hazard that assumes Principals made known their decisions to move at different times than each other. The data for the estimations was comprised of three separate cohorts of Principals who were new to a school in each of the years of 1999, 2000, and 2001; these Principals were then traced for the turnover behavior over the seven years of the data set up to 2006. The separate Cox regression included the same independent variables as used in the stability equations.

The statistical findings were mixed and inconsistent across the three outcomes. First, Principals exiting the system (rather remain at a given school) were positively related to Principals' total experience, having a doctorate degree, obtaining a BA from a highly competitive college, serving in schools with larger student enrollment, and serving in a middle school compared to high and primary schools. Second, Principals making a first move (rather remain at a given school) were positively associated with Principals' having higher relative salaries, having total experience, who are minority, and serving in schools with larger percentage of Hispanic students. Finally, Principals were more likely to make a second move (rather remain at a given school) if they were serving at a school (a) with larger enrollment, (b) that had a higher percentage of Black students, and (c) the grade level was high school (compared to middle and primary schools).

V. EMPIRICAL ANALYSES

For the present study, the empirical analyses of Principal retention, tenure, and turnover in the Delaware public school system are comprised of two parts. First, tabular displays of the major dimensions of retention, tenure, and turnover are presented. Second, statistical modeling has been undertaken to assess the potential determinants (bases or causes) of two separate outcomes: Principal retention and its alternative turnover actions as well as Principal tenure. Two perspectives are employed in the empirical analyses.

The static perspective provides a point in time look at Principal retention, tenure, and turnover. Specifically, the analyses are conducted about job status and job changes that occur for all Principals irrespective when they entered the Delaware public school system. A static view can entail (a) an annual (or periodic) “picture” of all Principals over a selected time period, or a focus on the extent of job status and/or job changes of all Principals over a time frame as with tenure. The dynamic perspective is concerned career mobility of Principals, i.e., how cohorts of Principals move in their career. This view involves both changes in position and roles of particular groupings of Principals (e.g., new Principals’ initial assignment, and Principals newly assigned to a particular school) throughout a time period within the educational system.

In the present study, the tabular displays are given for both the dynamic and static perspectives of Principal and Assistant Principal job decisions. These displays encompass a few but centrally important dimensions of Principal job behavior. Many other dimensions have been compiled but have been confined to the Appendix.

The statistical analyses involve two investigations. Regression models are employed to assess the determinants of Principal tenure. These analyses entail two different measurements of tenure and are undertaken as a static perspective. First, tenure is measured as the length of time in years that an individual has been a Principal within the Delaware public education system. Second, tenure is also measured as the longevity in years that an individual has served as a Principal in their particular school assignment.

With respect to retention and turnover, various regression models are employed for an evaluation encompassing a dynamic perspective. The focus is solely on the job choices or decisions that individuals make over a time frame after they are newly-appointed as Principals in which they are assigned to particular schools. That is, individuals are selected as units of analysis when they become first time Principals in the Delaware system and then assessed for

their decisions to move from their current school assignments throughout a time frame covered by the available data set. Consequently, equations are specified to evaluate the determinants of Principals' decisions to remain a Principal at their school (retention) compared to their various alternative turnover decisions to: (a) move as Principal to another school within their current district, (b) moved as a Principal to another district, (c) move to the central district office for an administrative position, (d) leave the Delaware public school system for retirement, and (e) the Delaware public school system, but not for retirement.

To conduct the empirical analyses, annual data on Principals within the Delaware public school system has been obtained from 1996 to 2009. Administrative data were collected for all Delaware administrators between SY 1995-1996 and SY 2009-2010 from the Delaware Department of Education. Data included basic demographics (gender, ethnicity, age, education, geographic location) and human resource data (experience, position, school, salary, and other professional characteristics). Additional data characterizing the school, district, and county (e.g. school type, school population, district size) was added from public records to provide greater detail about the working conditions and locations of school administrators. Descriptive analyses are inclusive of the 1996 to 2009 time period wherever possible. However, a lack of data on newly hired Principals/Assistant Principals before 1996 and incomplete data for some demographic and career characteristics prior to 2001 restricts some descriptive analysis and the statistical analysis to the nine-year period between 2001 and 2009. The time frame of the empirical analyses depends upon the particular research issue because of missing essential variables especially for the statistical analyses of retention and turnover which is limited to 2001 through 2008. Also because of incomplete data or too few observations, Principals from the following educational entities have been excluded: adult, alternative, early childhood, and special (children with autism, intensive learning, etc.). Charter schools were also excluded because of their differences from "mainstream" public schools and among each other.

V-1. PROFILE OF DELAWARE PUBLIC SCHOOL ADMINISTRATORS

In this section, we descriptively profile the demographic and career mobility characteristics of Delaware Principals and Assistant Principals between 1995 and 2009. The profile encompasses all Principals and Assistant Principals in the State system across all 19 public school districts and charter schools.

A. Demographic Profile

Various characteristics of the public school Principals in the state of Delaware are profiled in tabular form according to three major dimensions. First, statewide totals are given. Second, characteristics are displayed separately by the three Delaware counties: New Castle, Kent, and Sussex. Third, Principal characteristics are arranged on a statewide basis but according to educational grade levels: elementary school (grades 1-5), middle school (grades 6-8)¹⁰, and secondary (high) school (grades 9-12). Since a large number of tables have been generated, a limited number of tables that pertain to the most salient retention issues are presented in the text. Most of the tables were placed in Appendix A. Some commentary is provided for tables included in the text.

Appendix Tables A2-A4 presents three tables documenting the demographic profiles of all Principals and Assistant Principals between 2001 and 2009. These tables include a substantial amount of information that is not summarized here. However, they indicate some trends over time as well as differences between Principals and Assistant Principals that may be relevant to the issue of administrator turnover and retention.

- The average age of administrators is steadily declining, both for Principals (from 49.9 to 47.2) and for Assistant Principals (45.2 to 43)
- An increasing number of administrators were undergraduates at a Delaware institution for both Principals (69% to 73%) and Assistant Principals (74 to 78%)
- The average number of years' experience as a teacher is declining for both Principals (13.6 to 12.0) and Assistant Principals (14.7 to 11.8)
- The average years in administration in Delaware is rising for both Principals (5.7 to 7.8) and Assistant Principals (3.1 to 4.9)

¹⁰ Middle Schools may comprise grades 7-8 or grades 6-8.

- The average real (adjusted for inflation) salary rose between 2001 and approximately 2004 but has declined since for both Principals (\$103.9K to \$108.6K to \$106.2K) and Assistant Principals (\$97.1K to \$99.2K to \$94.8K)

The other demographic characteristics of administrators (gender, race, level of education, and state of origin) have remained approximately constant between 2001 and 2009.

We also examine the characteristics of administrators as distributed across county and school level (elementary, middle, and high schools). Tables A5 and A6 in Appendix A present a snapshot (2009) of selected demographic variables by county and level of school (elementary, middle, and secondary) for Principals and Assistant Principals. Other types of schools (for example, K – 8, early childhood, and vocational) are not included in the table because of the small number of cases in those categories.

These figures indicate that in general there are few demographic differences across county or school level. However, there is a large discrepancy in percentage of male administrative staff within school categories. As the grade level of the school goes up (as indicated by the type of school), the percentage of male administrative staff (both Principals and Assistant Principals) increases. Specifically, in the elementary schools, state-wide male Principals comprise 35% of all elementary Principals, while in secondary schools, male Principals account for over 78 % of all Principals. This same pattern is present when examining the distribution of Assistant Principals.

In sum, the profile of the Delaware administrator workforce indicates stability in the gender, race, and state origins of those leading our schools over time and across geographic locations. At the same time, there appears to be variation in the distribution of gender across school level and some significant change over time in the age and experience levels of administrators. We therefore include these variables in the statistical models presented later in this report to assess their relationship to Principal turnover and retention.

B. Profile of New Principals

The demographic profile presented in the previous section offers a static or cross-sectional view of the administrative workforce over time. Later in this report we examine retention and turnover in a dynamic, or longitudinal, approach as described in Section II B. Such an approach entails tracking cohorts of administrators as they move through their careers. We accomplish this by focusing on *new* Principals, defined as those appointed to the Principalship in

Delaware at the elementary, middle, and high school level for the first time in 1996 or later, and following their career mobility through the 2009-2010 school year. In this section we present a similar demographic profile specifically for these individuals as well as for new Assistant Principals. Table V-1 below presents the total number of new administrators hired in Delaware between 1996 and 2008, disaggregated by Principal and Assistant Principal.

TABLE V-1
NUMBER OF NEW ADMINISTRATORS
BY YEAR AND ROLE

| Year | New Principal Hires | New AP Hires | Total Administrator Hires |
|-------------|----------------------------|---------------------|----------------------------------|
| 1996 | 13 | 20 | 33 |
| 1997 | 14 | 19 | 33 |
| 1998 | 20 | 19 | 39 |
| 1999 | 23 | 42 | 65 |
| 2000 | 28 | 54 | 82 |
| 2001 | 38 | 47 | 85 |
| 2002 | 25 | 40 | 65 |
| 2003 | 32 | 29 | 61 |
| 2004 | 31 | 44 | 75 |
| 2005 | 31 | 43 | 74 |
| 2006 | 37 | 38 | 75 |
| 2007 | 23 | 39 | 62 |
| 2008 | 31 | 35 | 66 |

The demographic profile of new Principals between 1996 and 2008 is presented in Appendix Table A-7. The characteristics of new Principals is similar to that of all Principals in terms of a decline in average age (46 to 43) and relative consistency of the % male, % African-American, and education level. Unlike the larger body of Principals described in Section V-A, their average years teaching, salary, and % completing their undergraduate work in Delaware fluctuates but does not appear to rise or decline systematically.

Demographic characteristics of new Assistant Principals are presented in Appendix A-8. In comparison to new Principals, new Assistant Principals are younger yet still show a decline in average age (from 43 to 39 between 2001 and 2008), have approximately the same years of teaching experience as new Principals, and have approximately half the salary of new Principals (2009 average \$49,812 compared to Principals' \$105,000 in 2008).

We further consider the distribution of new Principals and Assistant Principals across county and school-level. Figures V-1 and V-2 present the percentage of new Principals and new Assistant Principals respectively that were assigned to elementary, middle, high, and vocational schools in Delaware¹¹. The right hand column reflects the proportion of Delaware schools that each type of school constitutes as a means for comparing the annual distribution of administrators to the population of schools. Though variability is evident across years, new Principals appear to be distributed approximately proportionately to the number of schools in each category. Assistant Principals, however, appear to be disproportionately assigned to middle, high, and vocational schools which likely reflect the larger student enrollment in these types of schools. However, between 23% and 52% of Assistant Principals were assigned to middle schools, which comprise only 18% of Delaware schools and this may suggest an issue with the retention and turnover at this school level in particular.

Figures V-3 and V-4 present similar analyses of Principal/Assistant Principal distribution by county. Both figures illustrate variability across years but over time, it appears that the distribution of administrators is proportionate to the distribution of schools across counties.

¹¹ We acknowledge that there are different configurations of public schools in Delaware as shown in the below table. Because of the low number of observations for some types of schools, detailed analysis will only include the public school configuration of elementary, middle, and secondary.

FIGURE V-1. PERCENT OF NEW PRINCIPALS ASSIGNED BY SCHOOL CATEGORY

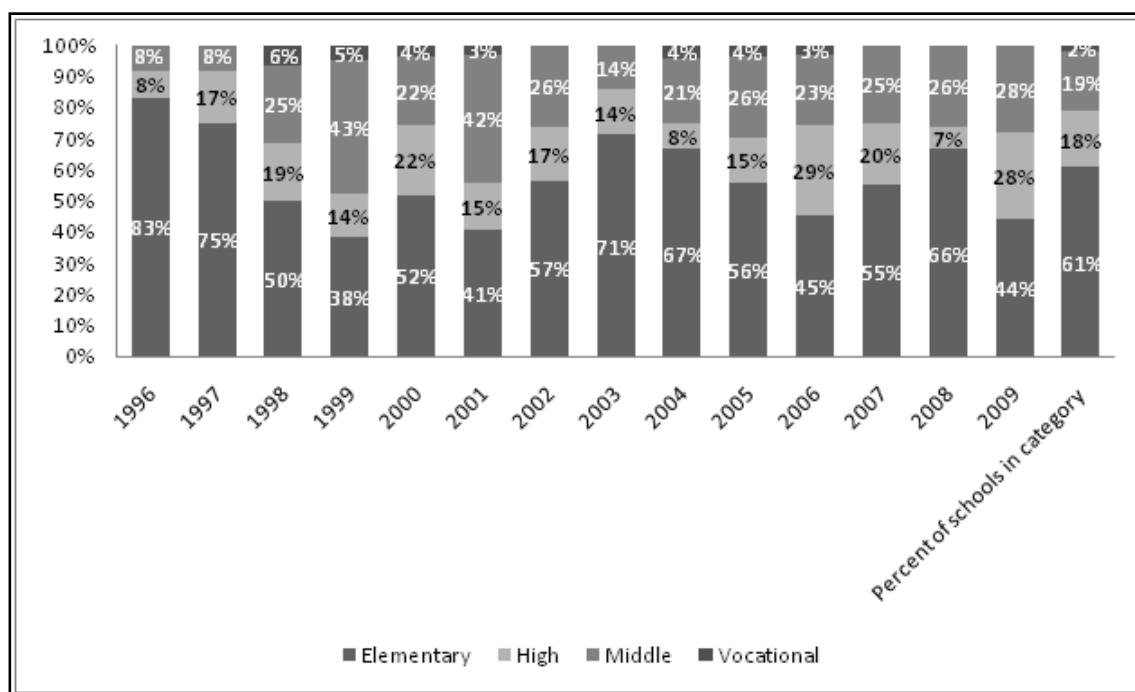


FIGURE V-2. PERCENT OF NEW ASSISTANT PRINCIPALS ASSIGNED BY SCHOOL CATEGORY

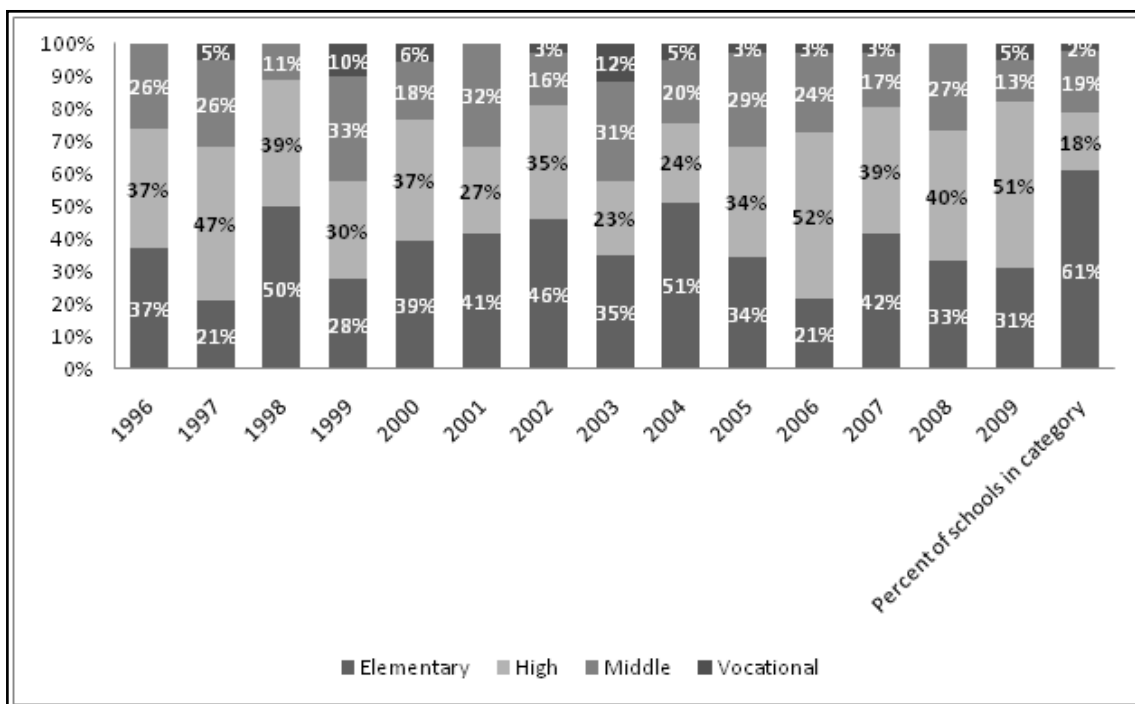


FIGURE V-3. PERCENT OF NEW PRINCIPALS ASSIGNED BY COUNTY

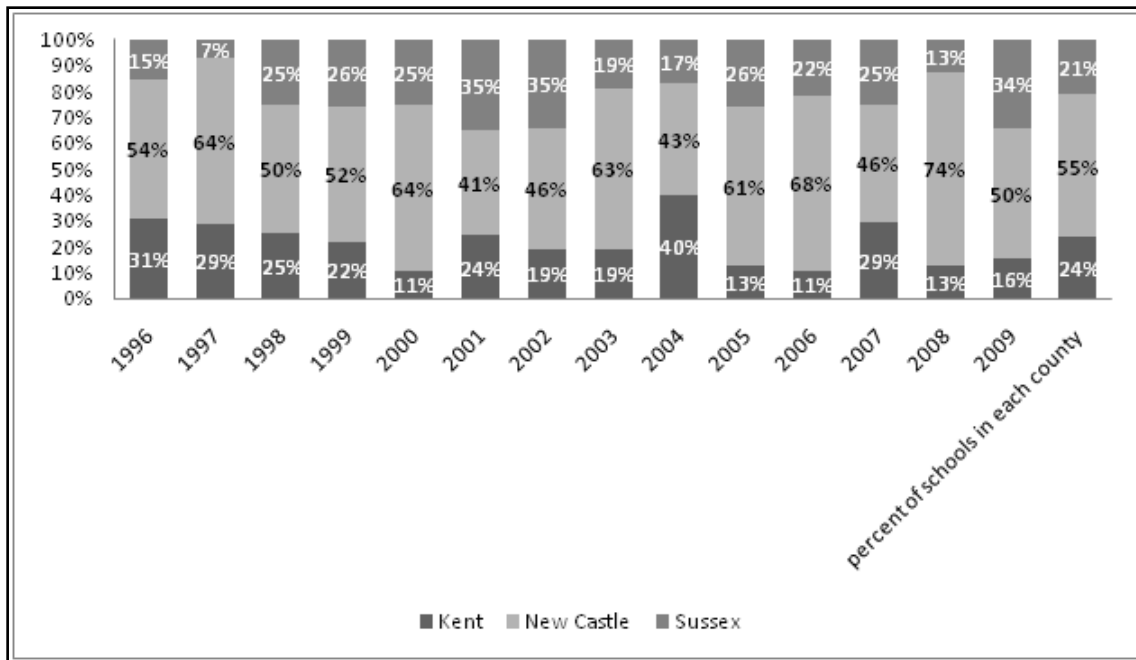
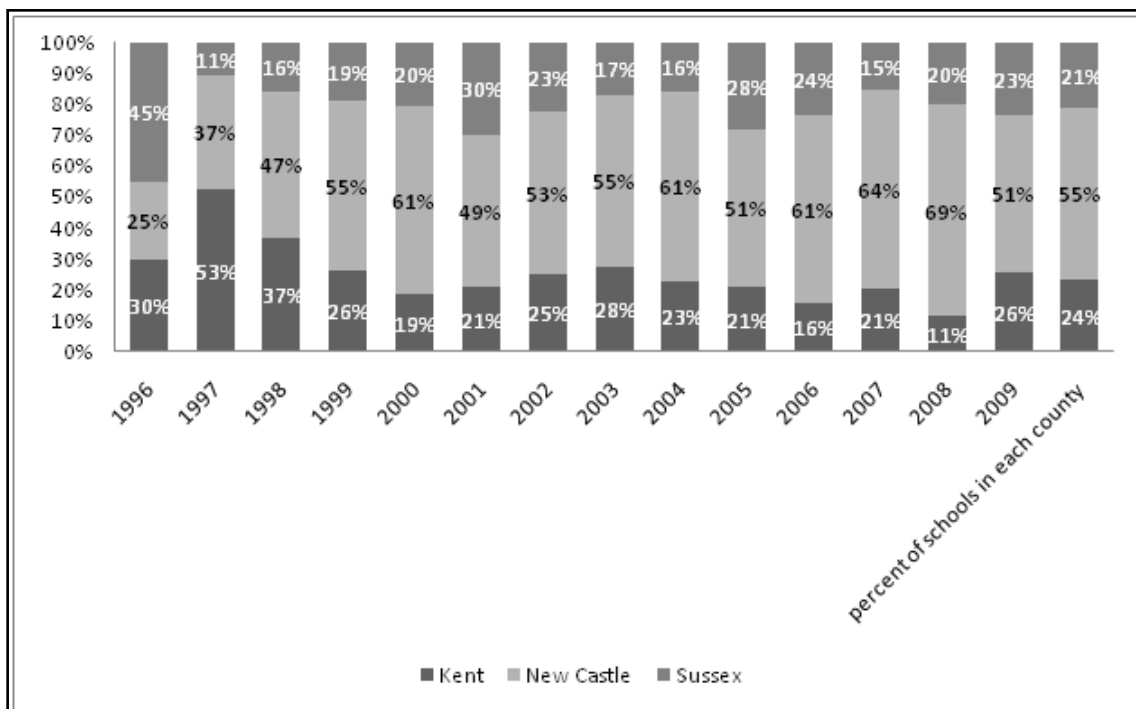


FIGURE V-4. PERCENT OF NEW ASSISTANT PRINCIPALS ASSIGNED BY COUNTY



C. Static Overview of Administrator Mobility

Our primary purpose in this report is to examine issues of retention and turnover behavior of administrators in Delaware which includes presenting profiles of both tenure in a position – defined earlier as the length of employment in a particular position (here, as Principal of a particular school) and the types of separations administrators experience between years.

In order to examine turnover, we tease out the various types of separations new Principals and Principals experience. Discussed earlier in this report, between any two years administrators can experience a change in location (e.g. school, district) as well as a change in role (e.g. to teacher, to central office). Tables V-2 and V-3 presents annual snapshots of administrator mobility between 1995 and 2008. Because this analysis is static – that is, examines individual movement between two years rather than following cohorts over time – we are able to include all Principals and Assistant Principals. Figures represent the percentage of the workforce either retained or experiencing a particular type of separation the following year.

The most striking figures in Table V-2 are the apparent stability of administration within each district (with between 80% and 94% of Principals retained in that role, though not necessarily the same school) between any two years. Of those remaining in their district, most continue in their same school, followed by between 2% and 10% of the total population who move to another school. The other significant portion of Principal transitions occurs with exit from the system which has increased dramatically beginning in 2000 to approximately 15% of the Principal workforce annually. Those exiting the education system (i.e. no longer employed as an educator in Delaware’s public school system) are generally split between retirement, movement into central office administration, and leaving the system, perhaps for another career or non-public school educational position. A small fraction of Principals change districts annually.

In Table V-3 we observe similar percentages of Assistant Principals remained in their district and moved between districts between any two years, but in comparison to Principals, Assistant Principals were more likely to have changed position and less likely to have left the system.

These findings emphasize leaving the system, movement between schools, and tenure in a particular role and school as potentially relevant outcomes in understanding retention and turnover of Principals and Assistant Principals in Delaware.

TABLE V-2

| MOVEMENT OF ALL PRINCIPALS BY YEAR (Percent) | | | | | | | | | | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Movement at End of Year | Year | | | | | | | | | | | | | |
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| <i>SAME DISTRICT</i> | 94% | 88% | 93% | 89% | 93% | 88% | 84% | 85% | 85% | 80% | 83% | 85% | 84% | 85% |
| Same school/same position | 91% | 82% | 82% | 83% | 87% | 82% | 78% | 78% | 79% | 74% | 76% | 77% | 79% | 78% |
| Same school/Asst. Principal | 0% | 0% | 0% | 0% | 0% | 1% | 1% | 0% | 0% | 1% | 0% | 0% | 0% | 0% |
| Different school/same position | 2% | 4% | 10% | 5% | 6% | 4% | 4% | 4% | 5% | 5% | 7% | 6% | 3% | 4% |
| Different school/Asst. Principal | 0% | 2% | 1% | 1% | 0% | 1% | 1% | 2% | 1% | 1% | 1% | 2% | 3% | 2% |
| <i>DIFFERENT DISTRICT</i> | 3% | 4% | 2% | 2% | 2% | 2% | 1% | 0% | 1% | 3% | 2% | 2% | 1% | 1% |
| Same position | 1% | 3% | 2% | 2% | 2% | 2% | 1% | 0% | 1% | 2% | 2% | 2% | 1% | 1% |
| Different position | 2% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 1% | 0% | 0% |
| <i>LEFT SYSTEM</i> | 3% | 8% | 5% | 8% | 4% | 10% | 15% | 15% | 14% | 17% | 16% | 13% | 15% | 15% |
| Retired | 0% | 0% | 0% | 0% | 0% | 1% | 3% | 5% | 4% | 4% | 2% | 3% | 5% | 3% |
| Central Office Administration | 3% | 5% | 3% | 5% | 4% | 4% | 4% | 5% | 3% | 5% | 6% | 5% | 5% | 5% |
| Central Office & Returned | 0% | 0% | 1% | 0% | 0% | 3% | 1% | 1% | 1% | 2% | 2% | 0% | 0% | 0% |
| Returned to teaching | 0% | 1% | 0% | 1% | 0% | 0% | 1% | 1% | 0% | 0% | 0% | 0% | 0% | 0% |
| Out of system, then Admin | 0% | 2% | 1% | 2% | 1% | 0% | 0% | 0% | 1% | 2% | 1% | 1% | 0% | 0% |
| Out of system | 0% | 0% | 0% | 0% | 0% | 2% | 6% | 4% | 5% | 5% | 5% | 5% | 5% | 7% |
| TOTAL | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

Same position = means individual remained a Principal; does not indicate if individual changed levels (i.e., elementary to high)

Out of system, then administration = was gone from system for at least 1 year and then reappears at admin level

Out of system = individual no longer in system, don't know what happened to them

Retired = individual out of system, and has 30 years or more of experience and/or is 65 years or older

Administration & Returned - Went to Admin and then returned as Principal

TABLE V-3

| MOVEMENT OF ALL ASSISTANT PRINCIPALS BY YEAR (Percent) | | | | | | | | | | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Movement at End of Year | Year | | | | | | | | | | | | | |
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| <i>SAME DISTRICT</i> | 92% | 94% | 94% | 95% | 90% | 95% | 88% | 91% | 84% | 86% | 85% | 88% | 87% | 90% |
| Same school/same position | 80% | 78% | 77% | 77% | 65% | 69% | 76% | 72% | 64% | 67% | 63% | 71% | 66% | 73% |
| Same school/Principal | 3% | 4% | 4% | 4% | 8% | 6% | 3% | 7% | 5% | 5% | 4% | 3% | 4% | 6% |
| Different school/same position | 6% | 9% | 6% | 6% | 8% | 10% | 5% | 9% | 10% | 8% | 12% | 8% | 11% | 7% |
| Different school/Principal | 3% | 3% | 6% | 8% | 8% | 9% | 5% | 4% | 5% | 6% | 5% | 6% | 6% | 4% |
| <i>DIFFERENT DISTRICT</i> | 3% | 6% | 3% | 5% | 6% | 4% | 2% | 3% | 5% | 2% | 2% | 2% | 2% | 3% |
| Same position | 2% | 5% | 1% | 3% | 4% | 2% | 1% | 2% | 1% | 2% | 1% | 2% | 1% | 0% |
| Principal | 1% | 1% | 2% | 3% | 2% | 2% | 2% | 1% | 4% | 1% | 1% | 1% | 1% | 3% |
| <i>LEFT SYSTEM</i> | 4% | 0% | 4% | 0% | 4% | 1% | 10% | 6% | 11% | 11% | 13% | 10% | 10% | 7% |
| Retired | 0% | 0% | 0% | 0% | 0% | 0% | 3% | 1% | 2% | 2% | 1% | 2% | 0% | 1% |
| Central Office Administration | 0% | 0% | 2% | 0% | 1% | 1% | 2% | 1% | 3% | 2% | 2% | 1% | 3% | 1% |
| Central Office & Returned | 0% | 0% | 0% | 0% | 1% | 0% | 1% | 1% | 1% | 2% | 1% | 1% | 0% | 0% |
| Returned to teaching | 0% | 0% | 0% | 0% | 0% | 0% | 2% | 2% | 2% | 2% | 3% | 0% | 0% | 0% |
| Out of system, then Admin | 0% | 0% | 1% | 0% | 0% | 0% | 1% | 0% | 0% | 1% | 0% | 1% | 0% | 0% |
| Out of system | 4% | 0% | 1% | 0% | 1% | 0% | 3% | 2% | 4% | 4% | 7% | 6% | 6% | 4% |
| TOTAL | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

D. Dynamic Overview of Administrator Mobility

The static approach presented in the previous section identifies the range and frequency of administrator behavior between years. However, we also employ a dynamic approach which is more useful in revealing the complexity of administrator behavior as it tracks individuals and cohorts over time. In this section we focus exclusively on *new* Principals (defined as becoming a Delaware Principal for the first time in 1996 or later) and *new* Assistant Principals (defined as becoming a Delaware Assistant Principal for the first time in 1996 or later), following their outcomes from their year of entry (cohort year) through SY 2009-2010 or their exit from the system.

To examine new Principals' tenure in a given school, we present the retention rates in Table V-4 which illustrates the percent remaining in their initial position (as Principal in the same school) over time (columns). The percentage is presented for each cohort of new administrators entering their positions in the years listed in the left column. From this we consider the following retention rates:

- After 1 year, the % of new Principals retained as Principal of the same school ranged from 74% in 2001 to 97% in 2008 with an average of 88%
- After 3 years, the % of new Principals retained as Principal of the same school ranged from 43% in 2006 to 77% in 1996 with an average of 56%
- After 5 years, the % of new Principals retained as Principal of the same school ranged from 18% in 2001 to 64% in 1997 with an average of 36%.

With some exceptions, the % of new Principals retained in their initial position each subsequent year declines for more recent cohorts of Principals, indicating increasing mobility of new Principals and therefore shorter tenure in their initial position.

Table V-5 illustrates the retention rates for each cohort of new Assistant Principals. Like new Principals, new Assistant Principals in recent years are much less likely to be retained in their original position than previously, though the retention rate in the initial position is much lower for Assistant Principals than Principals: in 2009, 74% of Assistant Principals were retained after 1 year, 29% after 3, and 20% after 5 whereas figures for Principals were 97%, 43%, and 39%.

TABLE V-4

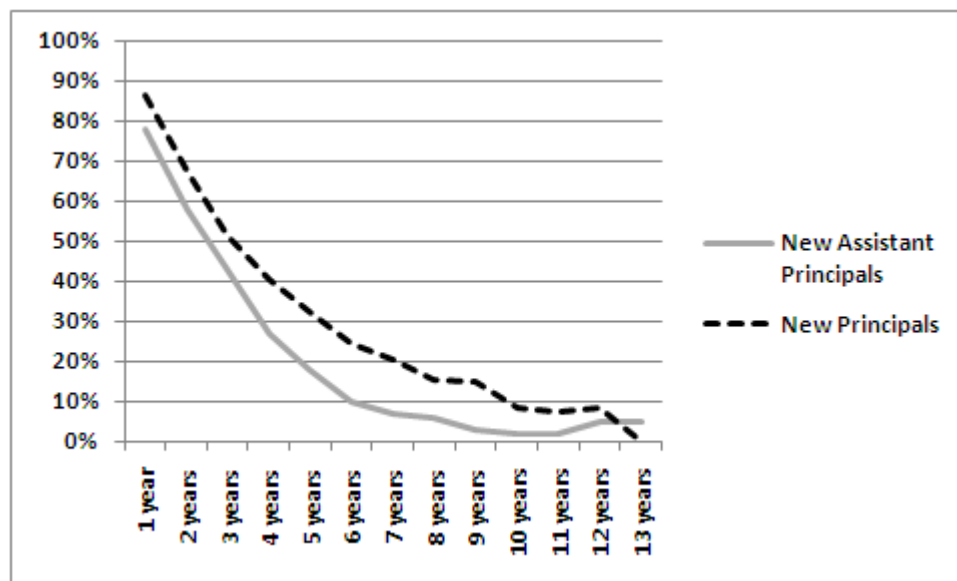
| NEW PRINCIPALS BY YEAR STARTED AND PERCENT STILL IN ORIGINAL POSITION FOR NEXT SCHOOL YEAR | | | | | | | | | | | | | | |
|---|-----------------------|---------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| Year Started | New Principals | Percent Still In Same Position | | | | | | | | | | | | |
| | | 1 year | 2 years | 3 years | 4 years | 5 years | 6 years | 7 years | 8 years | 9 years | 10 years | 11 years | 12 years | 13 years |
| 1996 | 13 | 85% | 77% | 77% | 69% | 62% | 46% | 38% | 23% | 15% | 8% | 8% | 8% | 0% |
| 1997 | 14 | 86% | 86% | 71% | 64% | 64% | 57% | 43% | 14% | 14% | 7% | 7% | 7% | |
| 1998 | 20 | 85% | 80% | 65% | 55% | 20% | 20% | 20% | 20% | 15% | 10% | 5% | | |
| 1999 | 23 | 87% | 57% | 57% | 48% | 39% | 39% | 22% | 17% | 17% | 13% | | | |
| 2000 | 28 | 86% | 64% | 54% | 32% | 25% | 18% | 14% | 14% | 14% | | | | |
| 2001 | 38 | 74% | 55% | 47% | 32% | 18% | 16% | 16% | 11% | | | | | |
| 2002 | 25 | 88% | 68% | 44% | 36% | 28% | 16% | 16% | | | | | | |
| 2003 | 32 | 84% | 72% | 50% | 31% | 28% | 19% | | | | | | | |
| 2004 | 31 | 87% | 71% | 52% | 39% | 39% | | | | | | | | |
| 2005 | 31 | 94% | 65% | 52% | 42% | | | | | | | | | |
| 2006 | 37 | 92% | 65% | 43% | | | | | | | | | | |
| 2007 | 23 | 96% | 78% | | | | | | | | | | | |
| 2008 | 31 | 97% | | | | | | | | | | | | |
| Average | 346 | 88% | 70% | 56% | 45% | 36% | 29% | 24% | 17% | 15% | 9% | 7% | 7% | 0% |

TABLE V-5

| NEW ASSISTANT PRINCIPALS BY YEAR STARTED AND PERCENT STILL IN ORIGINAL POSITION FOR NEXT SCHOOL YEAR | | | | | | | | | | | | | | |
|--|---------|--------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|
| Year Started | New Aps | Percent Still In Same Position | | | | | | | | | | | | |
| | | 1 year | 2 years | 3 years | 4 years | 5 years | 6 years | 7 years | 8 years | 9 years | 10 years | 11 years | 12 years | 13 years |
| 1996 | 20 | 90% | 80% | 65% | 25% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% |
| 1997 | 19 | 84% | 63% | 47% | 32% | 26% | 11% | 5% | 5% | 0% | 0% | 0% | 5% | |
| 1998 | 19 | 84% | 47% | 42% | 26% | 21% | 11% | 11% | 5% | 0% | 0% | 0% | | |
| 1999 | 42 | 71% | 52% | 40% | 26% | 12% | 10% | 5% | 5% | 5% | 5% | | | |
| 2000 | 54 | 76% | 63% | 50% | 30% | 20% | 13% | 7% | 7% | 6% | | | | |
| 2001 | 47 | 77% | 57% | 38% | 19% | 13% | 11% | 9% | 9% | | | | | |
| 2002 | 40 | 75% | 50% | 35% | 28% | 18% | 8% | 8% | | | | | | |
| 2003 | 29 | 76% | 66% | 52% | 31% | 28% | 17% | | | | | | | |
| 2004 | 44 | 77% | 55% | 36% | 32% | 20% | | | | | | | | |
| 2005 | 43 | 65% | 49% | 35% | 26% | | | | | | | | | |
| 2006 | 38 | 89% | 53% | 29% | | | | | | | | | | |
| 2007 | 39 | 77% | 59% | | | | | | | | | | | |
| 2008 | 35 | 74% | | | | | | | | | | | | |
| Average | 469 | 78% | 58% | 43% | 27% | 18% | 10% | 7% | 6% | 3% | 2% | 2% | 5% | 5% |

Figure V-5 presents the average trend (a mean percentage across all cohorts) for both new Principals and new Assistant Principals. For many administrators, these results indicate a short tenure in their initial position, and as noted for both roles, the retention rate has been decreasing in recent years.

FIGURE V-5. AVERAGE RETENTION RATES FOR 1996-2008 COHORTS OF NEW ASSISTANT PRINCIPALS AND NEW PRINCIPALS



In light of the declining tenure of new Principals in their initial positions, we examine the 5-year outcomes for cohorts of new Principals between 1996-2004 to determine their changes in role and/or location. Table V-6 presents these figures.

TABLE V-6

| 5 YEAR MOBILITY STATUS OF NEW PRINCIPALS HIRED 1996-2004 | | |
|---|----------|----------|
| Status | # | % |
| Same school | 76 | 34% |
| Principal | 73 | 33% |
| Assistant Principal | 3 | 1% |
| Different school, same district | 39 | 17% |
| Principal | 27 | 12% |
| Assistant Principal | 12 | 5% |
| Different school, different district | 13 | 6% |
| Principal | 10 | 4% |
| Assistant Principal | 3 | 1% |
| Left System | 96 | 43% |
| Retired | 20 | 9% |
| Central Office Admin. | 40 | 18% |
| Unknown | 32 | 14% |
| Teaching | 4 | 2% |
| Total | 224 | 100% |

This dynamic, longitudinal approach is a stark contrast to the static approach featuring all, not just new, Principals. Extrapolating from Table V-4 above, the average percentage of *all* Principals remaining in the same school between any two years is 86%, whereas after 5 years only 34% of new Principals remain in the same school. Similarly, we find an annual average of 12% of Principals moving out of the system while after 5 years 43% of new Principals are no longer in the system as a Principal.

TABLE V-7

| 5 YEAR MOBILITY STATUS OF NEW ASSISTANT PRINCIPALS HIRED 1996-2004 | | |
|---|----------|----------|
| Status | # | % |
| Same school | 106 | 34% |
| Principal | 48 | 15% |
| Assistant Principal | 58 | 18% |
| Different school, same district | 93 | 30% |
| Principal | 61 | 19% |
| Assistant Principal | 32 | 10% |
| Different school, different district | 45 | 14% |
| Principal | 29 | 9% |
| Assistant Principal | 16 | 5% |
| Left System | 70 | 22% |
| Retired | 3 | 1% |
| Central Office Admin. | 25 | 8% |
| Unknown | 29 | 9% |
| Teaching | 13 | 4% |
| Total | 314 | 100% |

For the 1996 through 2004 cohorts of new Assistant Principals, the 5 year outcomes are presented in Table V-7. According to *all Assistant Principals* in Table V-5, on average 14% move to a new school yearly whereas after 5 years 30% of new Assistant Principals are in a new school. Similarly, while only an average of 3% of all Assistant Principals move to a new district annually, 14% of new Assistant Principals move to a new district. In comparison to *new Principals*, after 5 years, new Assistant Principals were as likely as new Principals to be in the same school (though often in a new role as Principal) but were far more likely to have moved to a different district (14% compared to 6% of new Principals) and far less likely to have left the system (22% compared to 43% of Principals).

These differences are significant and highlight the importance of not merely considering a cross-sectional or static approach to Principal retention but a longitudinal approach that reveals the dynamic nature of Principals' career mobility.

E. Summary of Section V-1

The first of our objectives has been to present various profiles of Principals and Assistant Principals in their entrance into, their movement among and departure from their jobs (indicating turnover) as well as their continuation in their administrative jobs (generally referred to as retention) within the state of Delaware public school system. These profiles indicate several issues pertinent to administrator turnover and retention.

- The gender, race, and state origin of administrators is relatively stable over time, but the related issues of age, professional experience (as teachers and as administrators), and salary of administrators is changing over time. New administrators – Principals and Assistant Principals entering the system in 1996 and later – are increasingly younger, less experienced, and paid less than in previous years.
- Distribution of new Principal hires is proportionate to the distribution of schools across county and school level. The distribution of new Assistant Principals is skewed toward high, vocational, and, more significantly, middle schools, but is proportionate to the distribution of schools across county.
- Between any two years (the static or cross-sectional approach), there is great stability in the Principal workforce within district, though the percent leaving the system (generally equally for retirement, the central office, or leaving the education system altogether) appears to have jumped since 2000 and increased since then. Figures are similar for Assistant Principals though fewer are leaving the system.
- When examining cohorts of new Principals as they move through their careers (the dynamic or longitudinal approach), the picture is one of much greater mobility, with only a third remaining in their initial school after 5 years and nearly 43% leaving the system. For Assistant Principals greater proportions move between districts and positions with fewer leaving the system.

These profiles offer useful data on the demographic and career characteristics of administrators in Delaware and inform our second objective, an exploratory statistical (econometric) analysis of the determinants (“causes”) of several dimensions of retention and turnover behavior of Principals.

V-2. THE STATISTICAL ANALYSES

As with previous Principal retention studies, insight into the statistical analyses of retention and tenure of Principals are drawn mainly from the field of labor economics, which has considerable theory and empirical studies that can guide rigorous analysis of workforce activities and conditions. Labor economics has provided the formulation of the econometric (statistical) models and the selection and interpretation of variables that could account for Principals' career decisions. The regressions encompassed by the tenure and retention equations (discussed below) are derived from the Mincer human capital model. A central premise of the Mincer model is tenure, retention, and turnover are interrelated phenomena that are influenced by a very few and common forces. A specific and common regression formulation of the Mincer model is that wages of workers (thus Principals) are primarily a product of the age, education, present job experience (tenure), and prior job experience of workers. That is, these independent variables are predicted to be positively related to salary levels; thus the greater the value of these independent variables, the higher is the level of salaries. These variables indicate that individuals who manifest greater value of these variables will have higher skill levels and job capabilities, and consequently they would be expected to be rewarded with higher earnings; these differentials in earnings (salary) for differences in age, education, and work experience reflect an economic/financial return to an individual for having larger values of the variables.

One fundamental proposition, and also a major policy argument, that follows from the Mincer model is that retention and tenure of Principals in Delaware would occur due to their salary/wage levels and the extent of the benefits that they receive. Put differently, the extent to which Principals' compensation positively impacts their tenure and retention, the relationship indicates that remuneration is can provide an incentive for Principals to remain as Principals in the educational field, and to remain in their current positions. If these relationships are affirmed, then these two policy factors (salary/wages and benefits) could be adjusted (increased as would be expected) to enhance the retaining of Principals. Conversely, the verification that compensation, especially salary/wages, positively impacts tenure and retention, would also indicate that lower wages and benefits would influence turnover, i.e. Principals' decisions to move from their present position.

However, there are several research implications of salary levels and benefits. The salary levels of Principals alone may be inadequate for determining the bases of Principals leaving the

Delaware public school system. The impact of Principal salaries can be readily assessed for movement within and across school district, and to central administrative offices. For those Principals measured as leaving the Delaware system (and not retiring), the role of competing salaries is not clear-cut. These departing Principals may move to other opportunities in education or enter non-educational jobs. The types of benefits for Principals were similar or identical among school districts within the state of Delaware. Therefore, benefits should not be a determinant of Principals' moves within the state of Delaware public school system. However, employment benefits could influence Principals' decisions to leave the state system, but this hypothesis cannot be tested with available data.

As stated above, both the retention and tenure equations involve the variables of age, education, present job experience (tenure), and prior job experience of Principals. While these variables are expected to impact job longevity and retention, however, the bases and types of impacts of some variables are unclear. More specifically, it is unclear whether higher levels of education, and more experience motivate individuals to continually pursue a long career as Principal (tenure) or to change their profession, or simply to move to alternative position (change schools) or change educational roles (move to non-Principal positions). The expected impact of age may be somewhat complex. A lower age levels, new Principals may be more willing to favor decisions about moving, but after a particular age (bracket or grouping/ they may be more reticent to change their current position and thus favor retention. One caveat for the present study involves the level of Principals' education. Virtually all Principals in the Delaware system have a master's degree as their highest formal level of education. Consequently, because of the lack of variation among Principals, the level of education has not been introduced as an independent variable in the either the tenure or retention equations.

There are other likely determinants of Principal retention and tenure beyond the variables included explicitly in the Mincer model. These other variables are listed in Table V-8. The model also argues about the importance of variable that measure working conditions that could positively and negatively influence a worker's commitment to their job. Many of these other independent variables have also been utilized as determinants previous empirical research that also provide either "theoretical" (i.e., they give a rationale to support a particular hypotheses) and/or empirical verification of a variable's impact. The following independent variables are viewed as producing or representing challenging working conditions for Principals: % student

suspended, % student with free lunch, % minority students, and % special education students. Therefore they are expected to encourage turnover decisions and also shorten tenure.

A number of variables indicate either manifestation of greater leadership (math test scores), responsibility (number of students within school), higher status (teacher-student ratio), greater resource capability (expenditures per student, teacher-student ratio, expenditure per student, % of administration), and a student body that results in fewer social problems (teacher-student ratio, math test scores). These factors should promote Principals' willingness to remain in a position and to lengthen their tenure. The number of schools within a school district provides potentially more alternatives for Principals to exercise their decision to leave their present position, but its effect on tenure is ambiguous. Given it indicates higher levels of ambition, the number of prior moves made by Principals should be associated with decisions to make additional moves. There are other factors that are expected to account for differences in retention, turnover and tenure, but without any *a priori* substantive bases of their contribution: gender (male versus female Principals), the county where Principals hold appointment (Sussex, Kent and New Castle) and the level of school for a Principal's position (primary, middle, and high schools).

TABLE V-8

| NAME AND MEASUREMENT OF THE INDEPENDENT VARIABLES | | | |
|--|--|-------------------|---|
| Variable Name | Definition | Model Name | Model Measure |
| Age | Age of the Principal | Age | <i>Interval scale</i> |
| Gender | Female and male Principals | Male | 1= Male 0 = Female |
| Race | African-American and Caucasian Principals* | Afam | 0 = Others 1 = African American |
| Full-Time Salary | Full-time salary received in thousands, adjusted for inflation | Salary1000 | <i>Interval scale</i> |
| Administrative Experience | Administrative experience before becoming Principal | Totadminexp | <i>Interval scale</i> |
| Delaware Teacher Experience | Teacher experience in Delaware before administration | Detchexp | <i>Interval scale</i> |
| Moves | Number of moves since becoming a Principal | Moves | <i>Interval scale</i> |
| Middle School | Assigned to Middle School in Delaware | Middle | 0=Reference 1=Middle School Reference = Elementary School |

| NAME AND MEASUREMENT OF THE INDEPENDENT VARIABLES | | | |
|---|--|------------------|---|
| Variable Name | Definition | Model Name | Model Measure |
| High School | Assigned to a High School in Delaware | High | 0=Reference 1=Middle Reference = Elementary School |
| Kent | Principal works in a Kent County school district | NCC | 0 = Reference 1 = Kent Reference=New Castle County |
| Sussex County | Principal works in a Sussex County school district | Sussex | 0 = Reference 1 = Sussex County Reference=New Castle County |
| Teaches/Students | Teacher Student Ratio in the school | Teacher_students | <i>Interval scale</i> |
| Number of Students | Number of students in the school | Students | <i>Interval scale</i> |
| Percent Suspended | Percent of unique students in the school that have been suspended | Tsusp | <i>Interval scale</i> |
| Percent Free Lunch | Percent of students receiving free lunch in the school | Freelunch | <i>Interval scale</i> |
| Minority Students | Percent of minority students in the school | Minority | <i>Interval scale</i> |
| Special Education Students | Percent of students categorized as special education within school | Tspec | <i>Interval scale</i> |
| Math Test Scores | Percent of students passing standardized Math test within school | Math | <i>Interval scale</i> |
| Expenditures per student | Expenditures per student within district | Expenditures | <i>Interval scale</i> |
| Schools | Number of schools within district | Schools | <i>Interval scale</i> |
| Percent Administration | Percent of district in administration | AdminPercent | <i>Interval scale</i> |
| # of Years as Principal | # of Years as Principal at position | timethere | <i>Interval scale</i> |

A. Some Basics of Regression Modeling

For empirical research, a statistical model can include more than one regression equation. Each regression equation is comprised of a dependent variable and a set of independent variables, as illustrated by equation 1;

$$\text{Eq. (1): } Y = B_0 + B_1X_1 + B_2 X_2 + B_3 X_3 \dots + B_nX_n + U$$

Where:

The variable on the left side of the = sign are the dependent variable, X_1 , X_2 , and X_3 through X_n are separate independent variables in the equation, B_0 through B_n are regression parameters/coefficients that indicate the extent of the impact of the independent variables on the dependent variable, and U is the error term, which measures the amount of variance (difference) of the dependent variable not explained by the independent variables.

In a regression model, the dependent variable is the phenomenon that is selected to be explained for its differences (e.g., variation in length of tenure, and different choices involving retentions and turnover) among observations (viz. Principals). The independent variables on the right hand side of the equation, (i.e., the right side of the = sign), represent hypotheses that are tested with the estimation of a particular equation. A hypothesis provides an explanation for the expected/predicted relationship between an independent variable and a dependent variable. Put differently, a hypothesis clarifies why a personal, social, economic, or demographic characteristic would influence Principal retention or tenure. Hypotheses and thus the independent variables of a regression model do not have to be the same for all issues. Although the models will differ in the composition of their independent variables, there is a common set of independent variables on the right hand side of all the equations.

An independent variable can be concluded to have an impact on a dependent variable if the particular independent variable is statistically significant at the .05 level of significance, ($p < .05$). This level of significance means there is only a 5% chance (probability) that the affirmed relationship of the dependent variable with the selected independent variable would be incorrect. The .05 level of significance is the minimum level of significance for confirming hypotheses. In the present study, the impacts of many independent variables manifest a smaller (and more stringent) level of potential error .01 or greater .001 which indicates the chance that the confirmed relationships could be incorrectly affirmed is respectively only 1% and 0.1%. If they are robust when tested¹², -- as have been confirmed in the present study, -- the econometric models of retention and tenure outcomes should provide the capability to predict with acceptable accuracy the impact of (statistically) significant policy variables (i.e., variables that can be manipulated in their values) on the separate outcomes.

¹²An econometric model or equation is robust if its statistical results confirm expected relationships between the independent variable and the dependent variable, in this case retention, tenure or wages. Robustness is manifested by statistically significant relationships that account for a considerable amount of the variation (or differences) in the dependent variable(s).

Because of the mathematical complexity of the equations and because their interpretations are not readily accessible to most readers, all estimated equations and their relevant statistical results are shown in Appendix B. Technical dimensions of the various models and their analyses are confined to footnotes and citations. The statistical results are reported in the form of general statements of what (independent) variables/factors are significant determinants of issue differences (the dependent variable).

B. Principal Tenure

The statistical evaluation of tenure is a static analysis. It is concerned with assessing the bases of the length of time that all new Principals remain either in their particular positions as Principals or their role as a Principals in the Delaware system. Using two different definitions of tenure, two separate regression equations are formulated to consider the determinants of Principals' tenure, the dependent variable. First, tenure is measured as the length of time in years that an individual has been a Principal within the Delaware public education system. Second, tenure is also measured as the length of time in years that an individual has served as a Principal in their particular school assignment. The measurement of the dependent variables is presented in Table V-9.

TABLE V-9

| DEPENDENT VARIABLES OF TENURE EQUATIONS | | |
|--|--|---|
| Variable and Its Name | Variable Definition | Variable Measurement |
| TENURE _S | Length of Principal service in the Delaware public school system | Tenure measured in years of service as a Principal within the state |
| TENURE _P | Length of Principal service at a particular school | Tenure measured in years of service as a Principal at a school |

The following two equations are tested:

$$\text{Eq. (2): } \text{TENURE}_S = B_0 + B_1\text{SALARY} + B_2\text{AGE} + B_3\text{AGE}^2 + B_5\text{EXPER....} + B_nX_n + U$$

$$\text{Eq. (3): } \text{TENURE}_P = B_0 + B_1\text{SALARY} + B_2\text{AGE} + B_3\text{AGE}^2 + B_4\text{EXPER....} + B_nX_n + U$$

Where:

SALARY is the salary of a Principal in a particular year,

AGE is the age of a Principal in a particular year,

EXPER is the years of a Principal's work experience of prior to becoming a Principal,

X_n are independent variables (personal characteristics of a Principal, and the characteristics of the Principal's school, and the characteristics of the Principal's school district) hypothesized to explain the differences in tenure among Principals,

B_0 through B_n are regression parameters/coefficients that indicate the extent of the impact of the independent variables on the dependent variable, and

U is the error term, which measures the amount of variance (difference) of the dependent variable not explained by the independent variables.

Both equations are estimated with ordinary least squares estimator (OLS) since the dependent variable is a continuous (interval) scale measure with a range that manifests variation and is normally distributed. Estimation of both equations utilizes data from 2001 through 2008. The unit of observations for Equation 2 (with the dependent variable of tenure as Principal in the system) is each individual who was a new Principal during the 13 year time period. Each individual is counted as an observation for each year that they appear in the data set. Tenure is calculated as the number of years that an individual has served as Principal as of 2001, which is derived from past data. The value of tenure increases by one for each subsequent year that a person serves as a Principal. For Equation 3 (with the dependent variable of tenure in a Principal position), individuals can be included multiple times within the data set for analyses. Each individual is counted as an observation for each year that he/she has served as a Principal at a particular school. For each incidence of Principalship, the value of tenure is calculated as the number of years that the individual has been the Principal at the particular school. With both equations, the values of the independent variables are included for each year that a Principal appears as an observation, and those independent variables that vary through time (time varying covariates) on a yearly basis for an individual Principal correspond observation year of a Principals tenure value.

Since the dependent variables, -- TENURE_S and TENURE_P, -- are measured in the number of years for testing hypotheses, the value of a statistically significant coefficients can be interpreted for the OLS equations in one of two ways. If an independent variable is measured as an interval scale, -- e.g., SALARY, annual salary in thousands (\$1,000) dollars, -- the coefficient would indicate the unit change in the dependent variable that would occur with an absolute

change of one unit (a thousand dollars) in the independent variable. For example, if SALARY were found to be statistically significant with a positive sign and a coefficient of 0.02, then each additional thousand dollar increase in annual salary would yield a $2/10^{\text{th}}$ increase a year in Principal tenure. (That is, $.2 * 1 \text{ Year} = .2 * 12 \text{ months} = 2.4 \text{ months}$). Put differently, every additional \$1,000 in salary would account for an additional year in the tenure of a Principal (A year or $12 \text{ months} / 2.4 \text{ months} = 5$; $5 * \$1,000 = \$5,000$). This would indicate the costs of extending of Principals' tenure through salary increments. If the independent variable is categorical variable, -- e.g., MALE (= 1) or FEMALE (= 0), -- the coefficient would indicate the percentage difference in the dependent variable that would occur with one category (male) versus the other (female). For example, if the independent variable MALE were found to be statistically significant with a positive sign and a coefficient of 0.30, then male Principals would have tenure $3/10^{\text{th}}$ a year longer, or 3.6 months, than that of female Principals. (That is, $.3 * 1 \text{ Year} = .3 * 12 \text{ months} = 3.6 \text{ months}$).

This linear measurement of tenure in years permits ease of interpretation, and intuitively pleasing meaning. However, the most common measurement of job tenure in many retention studies has been that of natural log of job longevity. This alternative measure, -- referred to as a functional form transformation, -- produced very similar and only slightly different results than the linear measurement of tenure, but the linear models provided a better fit in the form of a higher adjusted R square.¹³ The estimated log-lin models (natural log of a dependent variable with independent variables measured in linear form in the regressions) have been put in Appendix B.

C. Principal Retention

As stated above, many equations are specified and then tested to evaluate the determinants of Principals' retention and turnover. There are six decisions by Principals that are evaluated: (1) remained a Principal at a school, (2) move as Principal to another school within

¹³ When the dependent variables are measured in natural logs, LTENURE, for testing hypotheses, the value of a statistically significant coefficient can be interpreted for the OLS equations in one of two ways. If the independent variable is measured as an interval scale, -- e.g., SALARY, annual salary in dollars, -- the coefficient would indicate the percentage change in the dependent variable that would occur with an absolute change of one unit (a dollar) in the independent variable. For example, if SALARY were found to be statistically significant with a positive sign and a coefficient of 0.04, then a one thousand dollar change in the annual salary would yield a four (4) percent increase in principal tenure. This would indicate that principals' extension of their tenure due to salary levels increments is limited (or small). If the independent variable is categorical variable, -- e.g., MALE (= 1) or FEMALE (= 0), -- the coefficient would indicate the percentage difference in the dependent variable that would occur with one category (male) versus the other (female). For example, if the independent variable MALE were found to be statistically significant with a positive sign and a coefficient of 0.06, then male principals would have tenure 6% higher than that of female principals. The resulting percentages from the coefficients can be converted to anti-log values which yield the linear measure per year as did the linear model.

their current district, (3) moved as a Principal to another district in ANY position, (4) move to the central district office for an administrative position, (5) leave the Delaware public school system for retirement, and (6) leave the Delaware public school system, but not for retirement.

To verify the determinants of these separate decisions, a longitudinal modeling approach has been undertaken. This modeling encompasses a discrete time competing risk model that was implemented by estimating seven separate multinomial complementary log-log equations. The longitudinal dimension signifies that data observations are over time about a group, viz. Principals, in which there are occurrences over time that are analyzed as outcomes such as any of the Principal decisions. Competing risk refer to each of the six decisions viewed as competing alternatives that have a probability of occurrence. The complementary log-log estimator is discussed in detail below.

The statistical analyses of these as separate equations allow a comparison of the bases of one decision relative to another alternative, e.g. staying a current school versus moving to another district. If all six decisions were to be compared with each other, then there would be 30 comparisons. To minimize complexity and information overload, the comparisons of Principals' alternative decisions are limited to the most policy relevant one. Every different decision about moving from a Principal's existing position is separately compared with the decision to remain or stay as a Principal in one's current position. Each of these separate comparisons comprises separate dependent variables for five separate competing risk equations. In addition to these equations, another one is tested in which all the decisions to move are combined and compared with a Principal decision to remain at their present school. The measurement of these dependent variables is presented on Table V-10.

TABLE V-10

| DEPENDENT VARIABLES OF SEPARATE EQUATIONS | | |
|--|--|---|
| Variable and Its Name | Variable Definition | Variable Measurement |
| ALL_DEP | All Principals Combined Who Made Any Move Compared to Principals Who Remained At A Particular School | Any Departure = 1 vs. Remained = 0 |
| SAME_DIST | Principals Who Moved To Another School Within The Same District Compared to Principal Who Remained At A Particular School | Moved To Same District School = 1 vs. Remained = 0 |
| DIFF_DIST | Principals Who Moved To Another School Outside of Their Current District Compared to Principals Who Remained At A Particular School | Moved To Different District School (in ANY position) = 1 vs. Remained = 0 |
| CENT_OFF | Principals Who Moved To Central Administrative Offices Within The Same District Compared to Principals Who Remained At A Particular School | Moved To Central Office = 1 vs. Remained = 0 |
| SYS_DEP | Principals Who Left System But Did Not Retire Compared to Principals Who Remained At A Particular School | Left But Did Not Retire = 1 vs. Remained = 0 |
| RETIRED | Principals Who Left And Did Retire Compared to Principals Who Remained At A Particular School | Left But Retired = 1 vs. Remained = 0 |

The definitions and measurement of the seven decisions that make up the six dependent variables are intertwined with the data recording of Principal assignments and employment within the state of Delaware as well as the requirements of the data array for longitudinal analysis. The unit of observations for the equations is each individual who was appointed for the first time as Principals in Delaware public school system during the nine year time period of the statistical analyses. Each individual is counted as an observation for each year that they were a Principal only over the nine years. These multiple counts of a person as an observation for each year that they are in the data set is referred variously to as work years, job years, or person

years. In effect, a newly first time Principal is “traced” throughout the nine years of the data set. If a person stayed at the same school over the nine year period, he/she would appear nine times in the data set over the nine year time frame. If an individual moved during the nine years to other schools but as a Principal within the state system they would also appear nine times in the data set. However, individuals would no longer be an observation in subsequent years after they left Principal positions in the Delaware system. This dropping of observations would occur when they left the public school system, retired, or move to central office of the school district. If anyone returned to a Principal position thereafter, they would enter data set in the year they came back.

The different Principal decisions representing Principal moves or lack thereof are incorporated in the various dependent variables. For all dependent variables (which portray two alternative decisions), there is an indicator and a reference category. For all the analyses, the reference category is always the same for each dependent variable, viz. all Principals were assigned (coded as) 0 if they remained or were retained at a particular school in a year. The indicator variable designates (coded as 1) those individuals Principals who manifested a specific type of decision to change their position or role in a particular year, e.g., move to another school in a district. These “movers” would continued to be included in the data set in subsequent years either as stayers in a “current” school and coded as 0, or if they moved again, they would be assigned a 1 to reflect the appropriate decision category, e.g. move to central office.

For all six dependent variables, the determination of a Principal’s decision was made by examining the data set provided by the State of Delaware Department of Education (DOE). Whether a Principal changed a position (Principal to Principal in a different location) or role (e.g., moved to central office) in a year could only be verified by tracking Principals through a year and then ascertaining whether a Principal returned to the same position or had moved to either another school, or another district or had left the system altogether at the beginning of the following school year. This meant that determination whether a Principal remained (or was retained) at the same school, moved as a Principal in same district (SAME_DIST), or moved to the different district (DIFF_DIST), or moved to the central office (CENT_OFF) was straightforward since these outcomes were clearly identified in data set. But a caveat is in order: as described in the tabular display section, there were only a limited number of moves to other district as a Principal, so that all moves to Principal positions in a different district were

combined with moves to assuming different roles (return to teaching and Assistant Principal positions) in different districts.

However, for two categories of decisions, judgments were exercised about the outcomes: Principals Who Left System but Did Not Retire (SYS_DEP), and Principals Who Left and Did Retire (RET). If a Principal was confirmed as not returning in the following year, one of two determinations was made for the analysis. One, if the non-returning Principal had 30 years of Delaware state service experience, including teaching experience, or was 65 year of age and older, then the non-returning Principal was defined as a leaver: retiree (RET). Two, if the non-returning Principal had fewer than 30 years of teaching experience as a teacher, or fewer than 30 years of Delaware state service, and less than 65 years old, then the non-returning Principal was defined as a leaver of the Delaware system (SYS_DEP).

The basic form of the competing risk equations that have been tested are:

$$(1) \text{ RETENTION} = B_0 + B_1 \text{ TENURE} + \dots B_n X_n.$$

Where:

RETENTION indicates any one of the six retention comparison listed on the above table,

TENURE is, years of service as a Principal at a particular school,

X_n are independent variables (personal characteristics of a Principal, and the characteristics of the Principal's school, and the characteristics of the Principal's school district) hypothesized to explain the differences in tenure among Principals, and

B_0 through B_n are regression parameters/coefficients that indicate the extent of the impact of the independent variables.

All six equations are estimated with the complementary log-log estimator, which is discussed below. Estimation of all equations utilizes annual data from 2001 through 2008. The independent variables in any of the estimated equation, if statistically significant, can be interpreted in the following way¹⁴ and illustrated with some examples of the dependent variable of SAME_DIST. The general interpretation for the impact of independent variables on the dependent variable is that a statistically significant independent variable increases or decreases the probability or likelihood of either moving or staying in the same school district, SAME_DIST. A positive sign for a statistically significant independent variable ($p < .05$)

¹⁴ The independent variables in any of the estimated equation, if statistically significant, can be interpreted in a similar way for the models of binary logistic analysis and multinomial logistic analysis, and cumulative logistic analysis.

indicates a greater likelihood of leaving. A negative sign indicates the likelihood of staying, or, put differently, less likelihood of leaving. The estimated regression coefficients also yield odds ratios¹⁵ that indicates the comparative probability of an occurrence of the dependent variable based on the value of the independent variable. If a categorical independent variable, say GENDER, has a positive sign and a coefficient with an odds value of 2, then male Principals have 2 times the odds of female Principals, (the reference category), to move to a Principalship in another school in the same district. Alternatively, male Principals are twice as likely as female Principals to leave their current positions for another Principal position in the same school district. If an independent variable with an interval scale, e.g., SALARY in thousands dollars, produced an odds ratio of 1.5 with a positive sign, then for every unit increase in the independent variable, \$1,000 in annual salary, the odds of a Principal would move to another school within the same district would increase by 50% (1.50-1.00 or 150%-100%).

D. Model Estimation

Initially the statistical technique of survival analysis (or duration analysis in economics) was chosen to assess the relationship of Delaware Principal retention (leave or stay as a teacher) with the specified independent variables. The Cox regression has been the most commonly used survival model in empirical analysis of labor force (such as Principal) retention. Survival analysis is a class of statistical regression methods for studying the determinants of events that manifest a qualitative change (e.g., nurses, public servants, Principals, and teachers' decisions to leave) over a time period. These models, including the Cox regression, would yield accurate (unbiased) results when the number of events (leaving) occur separately at various points in time. For example, Principals who are leaving would offer their resignations on various days so that none or only a few of the resignations would occur on the same date. Consequently, there would be no, or only a few ties in dates of departures, in which case only a small a number of teachers would resign on the same day. A general rule is: if ties account for five percent or less of the events (i.e. 5% or less of all Principal resignations would occur at the same precise time), then survival regression methods would produce reliable and valid findings.

However, the data for Delaware Principal retention is characterized by 100 percent ties a year for the event of Principals making any type of moves from a particular school. More

¹⁵ An estimated coefficient initially produces a probability estimate that must be transformed into odds ratio through the exponentiation of the estimated value of the coefficient.

specifically, all moves are recorded at the same time (at the end of the school year), since the Delaware Department of Education data does not verify the exact date of position or role changes. Rather, changes in the positions or roles of current Principals' position at a particular school changes can only be crudely confirmed with the data records by tracking Principal employment through a year and then ascertaining whether a Principal returns to an educational position at the beginning of the following school year.

With a large amount of ties, survival analysis would produce inaccurate estimates of the impacts of the specified independent variables (i.e., the regression coefficients would be biased). Because of this problem, the present study has employed a model that will yield comparable results of a survival analysis if ties either did not exist or exist in a small proportion. The model utilized is known as a complementary log-log model (CLLM).¹⁶

To estimate the CLLM, the dependent variable is, as stated above, discrete and coded into many categories. The estimation of the model requires, as described above, what is known as "per person years" as the bases of the data observations.¹⁷ The number of observations is greater than the number of newly hired Principals. For every year that a Principal remains in, including the year of entrance into, the Delaware public school system as a Principal, the individual is counted as a separate observation until he/she leaves the system. For example, if an individual entered in 2001, and remained as a Principal for the school years of 2002, 2003, 2004, and 2005, then that Principal would be counted as five separate observations, one for each school year. Likewise, if a person entered in year 2003, remained in a Principal position until 2004, and then left, the individual would account for two separate observations. If an independent variable changed in value for an individual teacher over the time period (i.e., it changed value from one observation to the next), then the changed value was used in the observation of the year during which the change occurred. For example, the initial value of salary and the age of a particular Principal were recorded for an initial observation of that Principal; then if the Principal appeared in the subsequent year, the changed (increased) value of salary and age were used for the subsequent observation.

¹⁶ The model is one of a class of generalized linear models (GLM) used to estimate the effect of independent variables on limited or qualitative dependent variables (variables coded as discrete categories and variables with measurements of many zeros and a limited numerical range). The complementary log-log model is calculated with a specific maximum likelihood estimator that is mathematically formulated to assess a discrete dependent variable in which the discrete variable has many ties and at least one tenure variable (e.g., length of experience) is specified as an independent variable.

¹⁷ This approach of per person repeated or multiple observations for each period is standard practice in labor economic studies of tenure and participation in the labor (teaching) workforce.

E. Exploratory Analyses

As stated above, both the tenure equations and the retention equations have employed virtually the same independent variables. A check for multicollinearity was undertaken for both types of equations. An assessment was conducted and determined that the Variance Inflation Factors (VIF), -- which determines the correlations among the independent variables on the right side of an equation -- proved to be inconsequential. All the independent variables had VIF values of less than five, indicating that the correlations among the variables were minimal and should not affect the estimated standard errors of the regression coefficients; consequently the determination of the statistical significance of the regression coefficients are not impacted.

There are few statistically significant variables that are common to the tenure and the retention equations. Only one independent variable is statistically significant and with the appropriate sign in all equations: total administrative experience of Principals. Moreover, the number of statistically significant variables in any model is also limited. Table V-11 provides an overview of the statistically significant independent variables (listed vertically) for each dependent variable of the tenure and retention equations (presented horizontally). The positive and negative signs designate the statistical significance as well as the direction of the impact of independent variable. The blank spaces indicate the lack of statistical significance of an independent variable. More detail consideration of the effects of the independent variables is presented by looking first at the results of the estimated tenure equations and then reviewing the findings of the estimated retention equations.

TABLE V-11. OVERALL RESULTS FOR TENURE, RETENTION, AND TURNOVER MODELS

| INDEPENDENT VARIABLES | TENURE MODELS | | RETENTION AND TURNOVER MODELS | | | | | |
|--|---------------------|--------------------|-------------------------------|-----------|-----------|----------|----------|---------|
| | TENURE AS PRINCIPAL | TENURE IN POSITION | ALL_DEP | SAME_DIST | DIFF_DIST | CENT_OFF | SYSR_DEP | RETIRED |
| <i>Principal characteristics</i> | | | | | | | | |
| Age | + | + | | - | | | | + |
| Age squared | | | 18 | 18 | 18 | 18 | 18 | 18 |
| Male | + | + | | | | | | + |
| African American | | | | - | | | - | + |
| Administrative Experience | + | + | - | - | - | - | - | - |
| Delaware Teaching Experience | - | - | | + | | + | | |
| Salary (Real) | | | - | - | - | - | | |
| Number of Moves | + | - | + | + | + | + | + | + |
| <i>School characteristics (annual)</i> | | | | | | | | |
| Middle | | | | | | | | |
| High School | + | + | | | | | | 18 |
| Kent | | | - | - | - | | | - |
| Sussex | | | - | | | | | - |
| Teacher Student Ratios | | | | | | | | - |
| Number of Students | | | + | | + | + | | |
| % of Students Suspended | | - | | + | | | | - |
| % of Students Receiving Free/Reduced Lunch | + | | | | | | | |
| % of Minority Students | | | | | | | | |
| % of Special Ed Students | | | + | + | | + | | |
| % of Students prof. in Math | + | + | | | | - | | |
| <i>District characteristics (annual)</i> | | | | | | | | |
| Expenditures per pupil | + | + | | | | + | | - |
| Number of schools | | | | | | | | - |
| Percent administration | + | | | | | | | |
| <i>Position characteristics</i> | | | | | | | | |
| Time in position | 18 | 18 | + | + | + | + | | |

¹⁸ Shaded table cells indicate that the variable was not used in that particular equation.

F. Tenure Findings

As stated above, there are two measures of tenure that have been evaluated for their determinants: (a) tenure measured as the length of time in years that an individual has been a Principal within the Delaware public education system, and (b) tenure measured as the length of time in years that an individual has served as a Principal in a particular school assignment. The separate models for these longevity measures are both statistically significant models with F-values at the .0001 level. The models accounted for a moderate amount of variance (difference) in the longevity among Principals with an adjusted R^2 of .47 and adjusted R^2 of .33 respectively for tenure as Principal within the system and Principal position. The findings are similar with many common statistically significant determinants in both equations, but they also had some very interesting different impacts by the hypothesized independent variables. What is surprising is that salary is not a statistically significant variable in either equation. That is, salary is not major influence a Principal's longevity in both a position at a given school or within the Delaware public school system longevity. The statistical results are presented in Table V-12 below. Again positive and negative signs indicate the statistical significance and the direction of the impact of independent variable, and blank spaces show a lack of statistical significance.

TABLE V-12. TENURE RESULTS

| Independent Variables | Tenure as Principal | Tenure in Position |
|--|----------------------------|---------------------------|
| Intercept | - | - |
| <i>Principal characteristics</i> | | |
| Age | + | + |
| Age squared | | |
| Male | + | + |
| African American | | |
| Administrative Experience | + | + |
| Delaware Teaching Experience | - | - |
| Salary (Real) | | |
| Number of Moves | + | - |
| <i>School characteristics (annual)</i> | | |
| Middle | | |
| High School | + | + |
| Kent | | |
| Sussex | | |
| Teacher Student Ratios | | |

| Independent Variables | Tenure as Principal | Tenure in Position |
|--|---------------------|--------------------|
| Number of Students | | |
| % of Students Suspended | | - |
| % of Students Receiving Free/Reduced Lunch | + | |
| % of Minority Students | | |
| % of Special Ed Students | | |
| % of Students at or above proficient in Math | + | + |
| <i>District characteristics (annual)</i> | | |
| Expenditures per pupil | + | + |
| Number of schools | | |
| Percent administration | + | |

Tenure of a Principal in a Position and the Public System

A. Variables with Common Impacts On Both Measures

1. Current salary (SALARY1000) was found not to be a statistically significant variable that is related to the length of tenure of Principals. That is, salary levels are not important determinant that explains the differences in the tenure among Principals.
2. Race is not a statistically significant variable. White and minority Principals have approximately the same job longevity in particular positions and within the system.
3. The tenure of Principals is not affected by county of service. When all other characteristics of Principals are considered, the decisions to stay as Principal is not influenced by whether the Principals serve in New Castle, Kent or Sussex County.
4. Not surprising, the age of Principals (AGE) is positively related to Principals length of commitment at a given school position and in the system. Put differently, Principals who have the longest tenure are older individuals.
5. There is a slight difference in the tenure of males and female Principals. On average, males remain Principals in the same school and in the public system respectively for 0.4 years and 0.3 years longer than female Principals.
6. Principals who serve in high schools (HighSchool) have only a slightly longer tenure at a given assignment as well as in the public system than Principals serving at middle and primary schools (both of which have the same job longevity). On average, high school Principals remain in the same school and in the public system respectively for 0.7 years and 0.7 years longer than their counterparts in middle and primary schools.

7. The percent of students passing standardized Math test within school is positively associated with both tenure measures, indicating more commitment to administrative longevity by serving in higher performing schools. The tenure of Principals in a position and within the system increases 0.02 years for every percentage increase in higher math scores.
8. The administrative experience before becoming Principal (Totadminexp) has a substantial positive impact on the tenure of Principals. For each year of prior administrative experience, individuals will remain 0.29 years longer as Principal in a given school assignment. Likewise, for each year of prior administrative experience, individuals will stay 0.38 years longer as Principals in the Delaware public school system.
9. Principals will have longer tenure in their positions and within the system where more resources are provided by a school district in which Principals serve. More specifically, Principal located in districts that have expenditures per student within district will remain longer in their administrative positions than their counterparts serving in lower funded districts.

B. Variables with Differential Impacts On Both Measures

10. The extent of Principals' teaching experience in Delaware (Detchexp) has a slight detrimental or negative effect on Principals' tenure within the Delaware public school system or in a given school.
11. The number of prior job moves as a Principal within or between school districts (MOVES) has a seemingly contradictory effect on the job longevity of Principals. Principal who had more career moves as Principals manifest shorter tenure in their current assigned position at given school, while the number of prior moves also facilitates longer tenure in the system. This may indicate that moves are a means to improve status, location, and salary, behavior that reflects the ambition of Principals who make more moves.
12. Unfavorable working conditions appear to have a "short-term" impact on Principals' tenure, but not on their long-run commitment. The percent of unique students in the school (TSUSP) that have been suspended does not determine Principals' tenure in the system. However, increasing volumes of suspensions is associated to less longevity in Principals' given school assignment.

13. The percent of district in administration (AdminPercent) does not affect decision to remain in a particular school but it does positively influence the length of time that one holds a Principal within system.
14. The role of the percent of students receiving free lunch in the school (Freelunch) is interesting finding but does not have a readily available explanation. The extent to which the student body receives free school lunches, generally interpreted as representing unfavorable working conditions, does not affect on the tenure of Principals' current positions but working conditions, but it is positively related to longer tenure within the public school system.

G. Retention and Turnover Findings

Six dependent variables were formulated to evaluate turnover decisions of Principals. These dependent variables represented six alternative moves that Principals could have made relative or compared with the outcome of remaining in the same Principal position (the reference category). The determinants of the six outcomes were evaluated with six competing risk models. The statistical findings of each of these equations will be discussed separately. Only a moderate number of the independent variables hypothesized to affect the outcomes were affirmed as statistically significant determinants. Only two independent variables were verified as common determinants of all six dependent variable outcomes: total administrative experience prior to becoming a Principal and the number of prior job moves made as a Principal. The statistical results are summarized in Tables V-14 through V-19 below. The positive and negative signs indicate the statistical significance and the direction of the impact of independent variable, and the odds ratios provide an assessment of the extent of the impact of the statistically significant determinants. However, before the statistical estimates are presented, a brief discussion is undertaken to consider the frequencies of the different decisions made for each outcome that comprise the dependent variables.

Retention and Turnover Decisions of Principals

Table V-13 presents the various dependent variables and their measurement, most of which were shown in the previous section. What is of notable for the empirical findings is the numbers in the last column. The numbers show that in the analysis there were quantity of decisions over the time frame of the data set; these decisions represented a summation of annual

counts of Principals' decisions/choice to either remain at their current school as Principal or to make one of the six moves (which are measured by the dependent variable). As given in row 1 and column 4, the total number of decisions is 955 ($955 = 758 + 197$). This total is derived from the 758 decisions to be retained/remain plus a total of 197 moves that were made over the time frame of the data set. The 197 moves represents a turnover of 21% ($=197/955$) over the nine years; however, it also indicative of substantial stability in the Principal work force of which 79% ($=758/955$) of all potential annual decisions to moves resulted in choices to stay a present assignment. As is given in column four, the substantial stability of Principals in the Delaware system can be further appreciated by looking at how small the proportion of decision moves is relative to the total number of decisions made. The most frequent decisions of movement are Principals' moves the central office of the district and moves out of the system without retirement.

TABLE V-13

| DEPENDENT VARIABLES OF SEPARATE EQUATIONS | | | |
|--|--|---|---|
| Variable and Its Name | Variable Definition | Variable Measurement | Decision Frequencies |
| ALL_DEP | All Principals Combined Who Made Any Move Compared to Principals Who Remained At A Particular School | Any Departure = 1 vs. Remained = 0 | 1 = 197 observations/decisions 0 = 758 observations/decisions 21% decisions to move (197/955) 79% decision to stay |
| SAME_DIST | Principals Who Moved To Another School Within The Same District Compared to Principal Who Remained At A Particular School | Moved To Same District School = 1 vs. Remained = 0 | 1 = 39 observations/decisions 0 = 758 observations/decisions 4.1% decisions to move (39/955) |
| DIFF_DIST | Principals Who Moved To Another School Outside of Their Current District Compared to Principals Who Remained At A Particular School | Moved To Different District School = 1 vs. Remained = 0 | 1 = 16 observations/decisions 0 = 758 observations/decisions 1.6% decisions to move (16/955) |
| CENT_OFF | Principals Who Moved To Central Administrative Offices Within The Same District Compared to Principals Who Remained At A Particular School | Moved To Central Office = 1 vs. Remained = 0 | 1 = 49 observations/decisions 0 = 758 observations/decisions 5.11% decisions to move (49/955)) |
| SYSR_DEP | Principals Who Left System But Did Not Retire Compared to Principals Who Remained At A Particular School | Left But Did Not Retire = 1 vs. Remained = 0 | 1 = 49 observations/decisions 0 = 758 observations/decisions 5.1% decisions to move (49/955) |
| RETIRED | Principals Who Left And Did Retire Compared to Principals Who Remained At A Particular School | Left But Retired = 1 vs. Remained = 0 | 1 = 23 observations/decisions 0 = 758 observations/decisions 2.4% decisions to move (23/955) |

Results of the Retention Equations

A. All Principals Combined Who Made Any Move

The statistical findings from the composite of all moves made by Principals are not commented upon in detail. Because it is a composite, it illustrates that focusing on Principals' staying versus all types of Principals' moves produces an aggregation effect. The results (Table V-14) mask the widely different findings across all the various alternative types of moves that Principals have made. Put differently, the separate outcomes have considerable differences in statistically significant determinants.

TABLE V-14

| STAYED VS. ALL OTHERS (ALL_DEP) | | |
|--|---------------------|-------------------|
| Variable | Significance | Odds Ratio |
| Administration Experience | - | 0.701 |
| Salary (Real) | - | 0.969 |
| Number of Moves | + | 10.109 |
| Kent County | - | 0.334 |
| Sussex County | - | 0.454 |
| Number of Students | + | 1.001 |
| Percent Special Education Students | + | 1.066 |

B. Principals Who Moved To Another School Within The Same District (Table V-15)

1. Principals who moved to another school within the same district account for 4.1% of all Principals' decisions and 19.8% (= 39/197) of all Principals' moves.
2. **AGE.** Age is negatively related to the decision to move as a Principal to another school within one's current Principal assignment. Principals who are older (age) more likely to remain at their current assignment, conversely younger more likely to move to another school in a district. That is, as Principals grow older, they are less likely to pursue another Principalship within their own school district.
3. **AFAM.** African American Principals are less likely to move to another Principalship in the same district than Caucasian Principals. Put differently, the odds are that Caucasian Principals are 6.1 times more likely to move within the same district than African American Principals.
4. **TOTADMINEXP.** Total administration experience before becoming a Principal is negatively related to undertaking a move to another Principalship within the same district.

Principals who have more pre-Principal administrative experience are more likely to remain at their current assigned school rather than move to another school as a Principal within their own district.

5. **DETCHEXP.** Principals with more years of teaching in Delaware before becoming a Principal have a greater probability of assuming a subsequent Principalship in another school within their current districts. The odds ratio for Delaware teaching experience is 2.7 that indicates for every year of experience the odds of a Principal would move to another school within the same district would increase by 170% (2.70-1.00 or 270%-100%).
6. **SALARY1000.** The current salary levels of Principals are negatively related to the dependent variable of Principals who moved to another school within the same district. Therefore Principals who receive higher salaries are less likely to change their present assignment and not likely to seek an alternative assignment in their own district. Put differently, with higher salaries, Principals are have greater odds of remaining at their current school and not assume another Principalship in their own district.
7. **MOVES.** Principals who had more moves as Principal prior to their present assignment are more likely to take another Principalship in their district rather than stay at their current school. The odds of moving compared to staying due to prior moves are substantial at 44.6. This figure and finding may indicate that prior moves represent the ambitions of individual Principals to improve their role in school leadership positions.
8. **KENT.** Principals assigned to Kent County schools are less likely to move to another school within their own county than Principals serving in New Castles and Sussex Counties (in which the same level of within district movement by Principals occur). The odds of Principals assigned to school districts in New Castle and Sussex counties to move to Principalships within their current district is 15 times that of their counterparts assigned to school districts located in Kent County.
9. **TSUSP.** Unfavorable working conditions appear to be a basis for a Principal to seek another Principalship within the same district. Principals serving in schools with larger percentage of unique students in the school that have been suspended are more likely to move for a Principalship within the same district rather than remain at one's current school. The odds ratio for suspension activity is small at 1.04 that indicates for every percentage of suspension

the odds of a Principal would move to another school within the same district would increase by 4% (104-1.00 or 104%-100%).

10. **TSPEC.** Another seemingly unfavorable working conditions looks to be a source of Principals to pursue another Principalship within the same district. Principals assigned to schools with larger percentage of students categorized as special education within school have a greater probability of moving as Principals within the same district rather than stay at their current school. The odds ratio for this situation is moderate at 1.26 that indicates for every percentage of special education students the odds of a Principal would move to another school within the same district would increase by 26% (126-1.00 or 126%-100%).

TABLE V-15

| STAYED VS. MOVED WITHIN DISTRICT AS A PRINCIPAL (SAME_DIST) | | |
|--|---------------------|-------------------|
| Variable | Significance | Odds Ratio |
| Age | - | 0.896 |
| African American | - | 0.164 |
| Administration Experience | - | 0.755 |
| Delaware Teaching Experience | + | 2.699 |
| Salary (Real) | - | 0.436 |
| Number of Moves | + | 44.643 |
| Kent County | - | 0.067 |
| Percent Students Suspended | + | 1.040 |
| Percent Special Education Students | + | 1.26 |

C. Principals Who Moved To Another School Outside of Their Current District

1. Principals who moved to another school outside of their current district account for 1.6% of all Principals' decisions and 8.1% (= 16/197) of all Principals' moves. However, there are only a few observations for this category, and it includes both Principals who moved as Principals and to non-Principal positions.
2. **TOTADMINEXP.** As with within district movement, total administration experience before becoming Principalship is negatively related to undertaking a move to another Principalship outside of their current district. Principals who have more administrative experience prior to becoming a Principal are more likely to remain at their current assigned school rather than move to another school external to their own district.

3. **SALARY1000.** The present salary levels of Principals were found to be negatively associated with the measure of Principals who changed their educational position outside their current district. That is, with higher salaries, Principals have higher odds of staying at their current school rather than taking another position outside their current district.
4. **MOVES.** Principals who moved more often as Principals before their present assignment are more likely to take another educational position or role outside of their current school district rather than remain at their present school. The odds of moving compared to staying due to prior moves are substantial at 45.6. This figure and finding may indicate that prior moves represent the ambitions of individual Principals to improve their role in school leadership positions.
5. **KENT.** Compared to Principals serving in school districts in New Castle and Sussex counties, Principals assigned to Kent County schools are less likely to leave their present school assignment than take an educational position or role outside their current district. The odds of Principals assigned to school districts in New Castle and Sussex counties to leave the Delaware public school system is 11 times that of their counterparts assigned to school districts located in Kent County.
6. **STUDENTS.** Principals serving at larger schools are more likely to pursue positions outside of their present district. The odds ratio for this situation is small at 1.01; it indicates for every student enrolled the odds of a Principal would leave the current district for another educational position in another Delaware district would increase by 1% (101-1.00 or 101%-100%).

TABLE V-16

| STAYED VS. MOVED TO ANOTHER DISTRICT (DIFF_ DIST) | | |
|--|---------------------|-------------------|
| Variable | Significance | Odds Ratio |
| Administration Experience | - | 0.654 |
| Salary (Real) | - | 0.822 |
| Number of Moves | + | 45.613 |
| Kent County | - | 0.111 |
| Number of Students | + | 1.01 |

D. Principals Who Moved To Central Administrative Offices Within The Same District

1. Principals who moved to central administrative offices within the same district account for 5.1% of all Principals' decisions and 24.9% (= 49/197) of all Principals' moves.
2. **TOTADMINEXP.** Similar to within district and outside district moves, total administration experience before becoming Principalship is negatively related to taking a position in the central administrative offices of one's current school district. Principals who have more administrative experience preceding their Principalship are more likely to remain at their current assigned school rather than move to the central administrative offices within their own district.
3. **DETCHEXP.** Principals with more years of teaching in Delaware before becoming a Principal have a greater likelihood of taking an administrative position in the central offices of their current districts. The odds ratio for Delaware teaching experience is 1.3 that indicates for every year of experience the odds of a Principal would move to the central administrative offices of their current assigned district would increase by 30% (1.30-1.00 or 130%-100%).
4. **SALARY1000.** The prevailing salary levels of Principals are negatively related to their decisions to move from their current Principalships to a position in the central administrative office of their same district. Consequently Principals who receive higher salaries are less likely to change their current assignment and forgo a move to an administrative position in their own district. Put differently, because of their higher salaries, Principals have greater odds of remaining at their current school and to not assume a job at the central offices of their own school district.
5. **MOVES.** Prior movements by Principals to Principalships are positively related to taking a position in the central administrative offices of their school district. Principals who had more moves as Principals prior to their present assignment are more likely to make a move to central school district office rather than keep their Principal assignment at their current school. The odds of moving compared to staying due to prior moves are phenomenally high. This figure and finding may indicate that prior moves represent the ambition of individual Principals to improve their role in school leadership positions, and that a central office assignment may be a very important career move.

6. **TSPEC.** An unfavorable working condition that looks to be a source of Principals' willingness to pursue a central district job is where a Principals' assigned school has a larger percentage of students categorized as special education. Principals assigned to schools with larger percentage of special education students have a greater likelihood of moving to the central office rather than stay at their current school. The odds ratio for this situation is moderate at 1.7 that indicates for every percentage of special education students the odds of a Principal would move to another school within the same district would increase by 70% (170-1.00 or 170%-125%).
7. **MATH.** The independent variable of MATH was found to be negatively associated with the outcome of Principals' movement to the central administrative office within their school district. This finding indicates that Principals who preside over schools with a greater percentage of students passing standardized math tests are less likely to move to a position within the central administrative offices of their own school district. Conversely, Principals who direct higher performing schools are more likely to remain at their current school assignment.
8. **STUDENTS.** Principals, who have been assigned to larger schools, -- as measured by the number of enrolled students, -- are more likely to move to central office administrative positions within their own school district. The odds ratio for this situation is small at 1.01 that indicates for every student enrolled the odds of a Principal would leave the current district for an administrative role at the central office of the school district would increase by 1% (101-1.00 or 101%-100%).
9. **EXPENDITURES.** District resources play a role in Principals' assignments. Expenditures per student within a school district are positively associated with Principals' movement to the central administrative office. Principals are more likely to move to positions in the central administrative offices in those districts that have higher expenditures per students. Conversely, Principals have a lower probability of moving to the central office if they are assigned to schools in distract that have lower expenditures per students.

TABLE V-17

| STAYED VS. MOVED TO CENTRAL OFFICE (CENT_OFF) | | |
|--|---------------------|-------------------|
| Variable | Significance | Odds Ratio |
| Administration Experience | - | 0.117 |
| Delaware Teaching Experience | + | 1.301 |
| Salary (Real) | - | 0.684 |
| Number of Moves | + | 814964.636 |
| Number of Students | + | 1.009 |
| Percent Special Education Students | + | 1.678 |
| Percent Passing Math Test | - | 0.906 |
| Expenditures per Pupils | + | 1.001 |

E. Principals Who Left System But Did Not Retire

1. Principals who left the Delaware public school system but did not retire account for 5.1% of all Principals' decisions and 24.9% (= 49/197) of all Principals' moves.
2. **AFAM.** African American Principals less likely to leave the Delaware public school system than their Caucasian counterparts. The odds of Caucasian Principals to leave the system are considerably higher than African American Principals. The predicted odds for Caucasian Principals to be leavers but not retirees are 3.5 times the odds of African American Principals.
3. **TOTADMINEXP.** As with other alternative types of career moves, total administration experience before becoming Principalship is negatively related to the decision to leave the Delaware public school system without retiring. Principals who have more pre-Principal administrative experiences are more likely to stay at their current assigned school depart the state system before retirement.
4. **MOVES.** Prior moves for Principalships are positively associated with Principals' decisions to leave the Delaware public school system. Current Principals at particular schools are likely to leave the state public school system if they have more moves as Principals prior to their present Principal assignment. The odds of leaving compared to staying due to prior moves are more moderate at 5.1 than for the impact that prior moves have on alternative decisions by Principals to move around within the state system. This figure and finding may

indicate that prior moves representative of the ambition of individual Principals to improve their role in school leadership positions.

TABLE V-18

| STAYED VS. LEFT (NON-RETIREEES) (SYSR_DEP) | | |
|---|---------------------|-------------------|
| Variable | Significance | Odds Ratio |
| African American | - | 0.283 |
| Administration Experience | - | 0.627 |
| Number of Moves | + | 5.067 |

F. Principals Who Left And Did Retire

1. Principals who left the Delaware public school system and did retire account for account for 4.1% of all Principals' decisions and 11.7% (= 23/197) of all Principals' moves.
2. **AGE.** As would be expected, a Principal's age is positively related to the decision to retire from the Delaware public school system. Principals who are older (age) more likely to retire from their current assignment.
3. **MALE.** Male Principals are more likely to retire earlier then female Principals. The odds of male Principal retiring early compared to females are 20.1.
4. **AFAM.** African American Principals more likely to retire earlier than Caucasian Principals. Put differently, the odds are that African American Principals are 5.7 times more likely to retire earlier within the same district than Caucasian Principals.
5. **TOTADMINEXP.** The same relationship prevails for retirement as with other alternative types of career moves. Total administration experience before becoming Principalship is negatively associated with the decision to leave the Delaware public school system as retiree. Principals who have more administrative experiences prior to their Principalship assignments are more likely to stay at their current assigned school before retiring from the state system.
6. **MOVES.** Principals who had more moves as Principals before their current school position manifest a greater probability to leave from a Principalship as a retiree of the Delaware public school system. The odds of retiring compared to remaining in their present position due to prior moves are substantial at 11.7.
7. **EXPENDITURES.** District resources are an important influence on Principals' retirements. Expenditures per student within a school district are negatively related to Principals' decisions to leave the Delaware public school system by their retirement. That is, Principals

who are eligible for retirement and assigned to schools located in districts with higher *per capita* student spending are more likely to remain than retire from their current position.

8. **TEACHER_ STUDENTS.** An expectation would be that where teacher-student ratios are higher, (more teaching staff relative to students), Principals would have more resources to achieve performance objectives. Such a situation would provide Principals with an incentive to remain at their school assignment, and those Principal presiding over schools with lower teacher student ratios would have less motivation to stay in their positions. Such a situation would also be expected to forestall retirements. This perspective is supported to some extent by the negative relationship was found between teacher-student ratios and the dependent variable in which measures retirement as the choice versus staying at one's assigned school. . More specifically, in schools with higher student-teacher ratios, Principals are less likely to retire, and more likely to remain at their present assignment.
9. **SCHOOLS.** The number of schools within district has a negative association with the dependent variable of Principals who left and did retire. This relationship indicates that the probability of retirement is lower for Principals who are assigned to schools within districts that have a larger number of schools within their purview. Conversely, there is greater likelihood of Principals retiring in school districts that have fewer schools within the district where their own school is located.
5. **KENT AND SUSSEX.** Compared to Principals serving in school districts in New Castle County, Principals assigned to schools in both Kent and Sussex Counties are less likely to leave the Delaware public school system through retirement. Conversely, Principals presiding over schools of district located in New Castle County have a higher probability to retire from the Delaware public school system than their counterparts in Kent and Sussex Counties.

TABLE V-19

| STAYED VS. LEFT AND RETIRED (RETIRED) | | |
|--|---------------------|--------------------|
| Variable | Significance | Odds Ratios |
| Age | + | 1.648 |
| Male | + | 20.172 |
| African American | + | 5.749 |
| Administration Experience | - | 0.595 |
| Number of Moves | + | 11.673 |
| Kent County | - | 0.003 |
| Sussex County | - | 0.006 |
| Teacher Student Ratio | - | 0.557 |
| Percent Students Suspended | - | 0.831 |
| Expenditures per Pupils | - | .9995 |
| Number of Schools | - | 0.794 |

H. Summary of Section V-2

In the previous pages we reviewed the findings specific to each of the eight statistical models predicting various forms of tenure, retention, and turnover. Here, we summarize the key results across the three categories of independent variables: Principal, school, and district characteristics.

Principal characteristics

The demographic characteristics – age, gender, and race – have some effects on administrator behavior but strongest in predicting retirement. On the other hand, Principals’ professional characteristics appear to have a more substantial effect on their careers: administrative experience and number of moves as a Principal are significant in all models, and salary is significant in four. The longer a Principal has been an administrator, the less likely they are to move – regardless of whether it be to another school, district, or out of the system. Additionally, the more moves a Principal has had, the greater the odds of them moving to another district, to the central office, or out of the system, which suggests more mobile Principals are difficult for districts and/or schools to retain. Finally, Principals with higher salary are less likely to move to another school, district, or to the central office. Note that this does not mean that those with lower salaries move to higher salaried positions – such a determination is not possible in this data and is beyond the scope of our analyses. However, this does imply that

salary is a factor in retaining Principals. Principals with greater years' teaching experience are also far more likely to move to another school within a district as well as to the central office. However, the policy implications of this finding are unclear.

School characteristics

In understanding the career behavior of Principals, school characteristics appear influential. Differences between elementary, middle, and high schools weren't evident, and geographic differences by county only affected retirement. However, in terms of movement between schools, districts, to the central office and out of the system, it appears that more challenging school conditions increase the likelihood of turnover. These characteristics – teacher-student ratios, student enrollment, percent of students suspended, percent of minority students, and percent of special education students – are not consistent across models but do indicate that working conditions are a factor. Conversely, retention is increased when school characteristics are more positive – as indicated by the percent of students at or above proficient in math.

District characteristics

Across models, few district characteristics appear significant. The most notable is district expenditures per pupil, which was found to be positively associated with tenure in position, tenure as Principal, and movement to the central office. This suggests that Principals in districts with higher per-pupil spending are more likely to stay in administration, as a Principal or an administrator in the central office.

VI. CONCLUDING REMARKS

The descriptive and statistical analyses presented in Section V offer an exploratory analysis of the career behavior of Principals and Assistant Principals in Delaware between 1995 and 2009. While the static snapshots in Section V-1 portrayed a high degree of stability in the administrative workforce, the dynamic or longitudinal profiles revealed notable complexity in the careers of administrators. We therefore used a dynamic approach in the statistical analyses by following first time, newly-hired Principals between 2001 and 2008. Both the descriptive and statistical analyses offer important and policy-relevant information about current retention and turnover rates as well as factors or “causes” of these behaviors in Delaware Principals.

A. Comparison of Findings with Previous Research

After considering the findings of the descriptive and statistical analyses, we compare the case of Delaware to the cases of North Carolina, Illinois (Gates, et al, 2006), New York (Papa, 2007), Missouri (Baker, et al, 2010), Texas (Fuller and Young, 2009), and Miami-Dade (Loeb, et al, 2010) featured in the related quantitative research reviewed earlier. Table VI-1 synthesizes those findings in terms of retention figures and factors observed to influence retention, exit, and mobility behavior. Additionally, any limitations in the comparisons across cases are discussed as well.

Retention

Delaware’s retention rates at the same school after 5 years were comparable to the other cases, most closely North Carolina as reported in Gates et al (2006) and Texas as reported by Fuller and Young (2007). Further, a comparison of 5 year outcomes for cohorts also shows similarities in the percent of Principals moving to other schools within their district, moving between district, moving into other administration (e.g. central office) and leaving the system.

Factors influencing mobility

It is difficult to fully compare the statistical findings presented here to other cases, as the limitations listed in the chart reveal differences in sample, outcome, or independent variables across studies. However, there is some commonality across cases. In terms of retention, administrator and career characteristics are inconsistent, yet all three cases suggest that retention is lower in more challenging contexts – schools with high rates of suspension, minority populations, or poverty. Age and school enrollment appear to be common factors in leaving the

system (for retirement in Delaware's case). Common on factors in changing schools include administrative experience, age, and location (in some cases urbanicity), whereas school level and population seem to have mixed effects across cases. There were no evident commonalities across movement in positions.

Connections to *Tracking Transitions* Report

The University of Delaware recently published a statewide qualitative study of administrator career paths (Farley-Ripple, Mead, Raffel, Sherretz, and Welch 2011) which is a companion piece to this quantitative project. The findings of that study are useful in interpreting and confirming our quantitative results.

Farley-Ripple, et al. presents qualitative findings related to administrator characteristics, position characteristics, and system characteristics (p. 110). Our findings related to the characteristics of administrators show some effects of age, gender, and administrative experience on retention and mobility. These are also mentioned in the *Tracking Transitions* report, which additionally identifies many characteristics that are unobserved in our quantitative data, including motivation, coping, impacts on health and family, and informal and formal preparation experiences. These may be significant factors in explaining administrator career choices that we cannot include in our model.

In terms of position characteristics, we found evidence that higher salaried Principals are less likely to move within the system, in comparison to the qualitative findings in which salary is discussed but not as a central incentive. School level, school size, and school population (enrollment, percent special education, percent free/reduced lunch, and percent proficient in math) have significant effect, while only school level was presented as an issue qualitatively. However, the variability of these school effects across types of mobility and some of the unexplained relationships (e.g. between percent free/reduced lunch and tenure) may be better understood in comparison to the qualitative findings.

In terms of system characteristics, we found few effects at the district level yet data in *Tracking Transitions* suggests that district context (including support and politics) appeared to be a significant factor in administrator's movement and sense of efficacy. Retirement benefits and incentives to retire or continue as an administrator were also discussed and may be modeled quantitatively but are beyond the scope of our work here. Other system characteristics, such as

autonomy and job security, are not observable in our models but may impact administrator behavior.

In addition to those three categories of factors identified in *Tracking Transitions*, the report highlights observed tensions in the careers of administrators that may help to explain quantitative results as well. First is the issue of choice. In a significant number of cases, Delaware administrators reported being assigned or re-assigned involuntarily by their superintendent or school board. This absence of choice challenges the notion that Principals and Assistant Principals choose their schools based on characteristics, salary, or other criteria, as often assumed in studies of administrator behavior. Therefore, factors identified as significant or insignificant in our statistical analyses should be considered with this caution in mind.

A second tension highlighted in *Tracking Transitions* is the informal/formal preparation issue. Of particular relevance is the role and careers of Assistant Principals, which the qualitative study considered to have important policy implications because of differences in roles and aspirations (or lack thereof) to the Principalship. Our descriptive analyses build on those findings, revealing potentially important differences in the career behavior of Assistant Principals in comparison to Principals. However, modeling their behavior is beyond the scope of this report.

Based on both studies, this is an issue warranting further inquiry.

A final tension in *Tracking Transitions* is between stability and mobility which revealed concerns about the frequency of reassignment between schools and the ability to be effective in creating the change necessary to improve teaching and learning. Our analyses produce effects for the number of moves in administrators' careers which adds another dimension to this particular tension. Specifically, administrators with greater number of moves are more likely to move again – whether within the district, to the central office, across districts, or out of the system.

TABLE VI-1. PREVIOUS RESEARCH COMPARISONS

| | Delaware | North Carolina | Illinois | New York | Missouri | Texas | Miami-Dade |
|--|---|---|---|--|--|--|---|
| Retention figures | For all first-time principals, the 1 year retention rate in the same school averaged 88%, the 3 year rate averaged 56%, and the 5 year rate averaged 36%. 5-year outcomes for cohorts were 34% in the same school, 17% in a different school, 6% in a different district, and 43% had left school administration (18% were in the central office). | For first-time principals, 6-year rates: 37% principal in same school, 13% in different school in the same district, 11% in a different district, 4% in other administration, 18% left the system, 2% other | For first-time principals, 6-year rates: 21% principal in same school, 25% in different school in the same district, 9% in a different district, 16% in other administration, 14% left the system, 1% other | 4-year outcomes for newly hired principals: 46% were in the same school/role, 5% in another position; 7.9% in another school, 6.6% in another position there; 7.1% in another district, 4.5% in another role; 22.1% left the system | 7-year principal stability was 65% - the % remaining in the same school during that time | For principals newly assigned to schools the 1 year retention rate is 80.3%, 3 year rate is 63.7%, 5 year rate is 39.4%, and 10 year rate is 13.2% | 6-year outcomes indicated that 81% of principals were at the same school during time period |
| <i>Factors influencing principal:</i> | | | | | | | |
| Retention | <i>For tenure in system:</i> male (+), age (+), high school (+), administrative experience (+), DE teaching experience (-), number of moves in system (+), % of free/reduced lunch students (+), % proficient in math (+), % of district personnel in central office (+), district expenditures per pupil (+); <i>In position:</i> male (+), age (+), high school (+), administrative experience (+), number of moves in system (-), % of students suspended (-), % proficient in math (+), district expenditures per pupil (+) | | | <i>Across districts:</i> <5 years's district experience (-), school enrollment (-), % of students that were non-white (-) or LEP (-), % of uncertified teachers (-); <i>Within a district:</i> salary (+), % of student population non-white (-) | | school level, school poverty (-), school, performance (+), location (suburban (+), rural (-)), principal gender (but interacts with level) and age (an inverse U relationship) | |
| Exit system | <i>Non-retired:</i> African-American (-), administrative experience (-), number of moves (-) | principal age (+), urbanicity (+) | principal age (+) and race (when not matched to school population), school | | administrative experience (+), having a doctorate (+), school | | % minority student population (+), % of low performers in math (+), school |

TABLE VI-1. PREVIOUS RESEARCH COMPARISONS

| | Delaware | North Carolina | Illinois | New York | Missouri | Texas | Miami-Dade |
|---------------------------|--|---|---|---|---|---|--|
| | <i>Retired:</i> age (+), male (+), administrative experience (-), number of moves (+), county (non-New Castle) (-), teacher-student ratio (-), % of students suspended (-), district expenditures per pupil (-), number of schools in district (-) | | enrollment (-), urbanicity (-) | | enrollment (-) and middle school (-); | | accountability grades (+); administrator characteristics not reported |
| Changing schools | <i>In same district:</i> age (-), African-American (-), administrative experience (-) DE teaching experience (+), salary (-), number of moves (-), county (non-New Castle) (-), student enrollment (+), % of special education students (+), time in position (+); <i>in another district:</i> administrative experience (-), DE teaching experience (+), salary (-), number of moves (+), Kent County (-), student enrollment (+), time in position (+) | school enrollment (-), middle school, urbanicity (+); | principal age (-) and race (when not matched to school population), school enrollment (-), high school, urbanicity (+); | | first move: administrative experience (-), race (when not matched to student population), % of students of Hispanic origin (+); second move: school enrollment (-); % student population that is black (+), high school | | School accountability grades (+); administrator characteristics not reported |
| Changing positions | <i>To central office:</i> administrative experience (-), DE teaching experience (+), salary (-), number of moves (+), student enrollment (+), % special education students (+), % of students proficient in math (-), time in position (+) | middle school, high school, urbanicity (-) | school enrollment (-), middle school, high school, urbanicity (-) | | | | |
| Limitations on comparison | Retention figures are from first-time principals between 1996 and 2004; | Retention figures are from first time principals between 1987/88 and 1991/92. Mobility analyses conducted on <i>all</i> | | Analyses include principals new to their school (not first- | Analyses examine outcomes for principals new to a | Analyses focus on principals new to their school (not | Retention and mobility figures focus on <i>all</i> |

| TABLE VI-1. PREVIOUS RESEARCH COMPARISONS | | | | | | | |
|---|--|---|----------|--|---|---|--|
| | Delaware | North Carolina | Illinois | New York | Missouri | Texas | Miami-Dade |
| | statistical analyses include first-time principals between 2001 and 2009 | principals between 1987 and 2001. Mobility analyses compare those staying in the same school to three outcomes: leaving the system, moving to another school (anywhere), and moving to another position (in education). | | time principals) between 1991/2 and 1999/0. Retention is defined as remaining in a school for 4 or more years. | school (not newly hired principals) in 1999, 2000, and 2001. Retention figures are based on computation of a “stability” index. The mobility outcomes considered are exit from system, first and second move. | first-time principals) between 1996 and 2008. Analyses are cross-tabulations and not statistically modeled. | principals between 2003/4 and 2008/9. Mobility analyses compare those staying to those who exit district dataset and those who move schools only, focusing on school characteristics related to the equitable distribution of principals |

B. Questions left unanswered

The findings of this study are valuable in understanding the career behavior of Delaware administrators and identify several factors associated with tenure, mobility, and exit from the system. However, these findings also raise a number of additional questions that extend beyond the scope and purpose of this report. We highlight those issues here as directions for further research to inform efforts to recruit, retain, and support administrators in Delaware schools.

- **A focus on schools.** The unit of analysis in this study is the Delaware administrator (Principals and Assistant Principals) as our intent is to understand their career behavior. The other perspective not addressed here is the level of turnover or instability experienced *by schools*. This is the approach taken by Partlow (2007) and is useful in examining what characteristics of schools and districts are associated with various degrees and forms of turnover in leadership.
- **A focus on destinations.** The analyses presented here examine the characteristics of Principals and Assistant Principals as well as the schools and districts in which they were working when making the decision to stay or move. We did not examine their destinations – the characteristics of the positions, schools, or districts to which they moved. A detailed comparison of their current versus destination roles and/or positions could further inform our understanding of what motivates administrator career behavior.
- **A focus on Assistant Principals.** Evident in the review of literature and comparison of findings is a focus on Principals rather than Assistant Principals. We examine the static and dynamic mobility of Assistant Principals in Delaware descriptively but do not include them in the statistical models for reasons presented earlier, including factors related to the opportunity structure of school administration as well as potential differences in the nature of the position. However, even our descriptive findings suggest that Assistant Principal behavior differs from Principals and, because many of these individuals are in the pipeline to Principal positions, understanding their career behavior is an important and significant step.
- **A focus on effects.** Studies of the effects of Principals and other school leaders on student achievement reveal that these effects are second only to teacher effects, explaining about one quarter of all school effects (Leithwood et al., 2004). More specifically, research shows that Principals, in particular, exert indirect influence over a

number of critical aspects of schooling, including framing purposes and goals, structure and social networks, and organizational culture (Hallinger and Heck, 1998). Studies also focus on the impact of particular leadership practices on these aspects of schools (e.g., Seashore-Louis et al., 2010) and many have established the effect size of specific practices on student outcomes such as achievement, engagement, and attitude (Waters, Marzano, & McNulty, 2003; Robinson, Lloyd, & Rowe, 2008). However, none of the studies of administrator career behavior examine the effects of turnover on any aspect of teacher or student performance. Analysis of retention and turnover rates is an important step in understanding and supporting the improvement of school leadership, yet it is unclear what length of tenure or what rate of turnover is beneficial or harmful to teaching and learning. Therefore, additional research on the effects of administrator retention and mobility are recommended.

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APPENDIX A

Descriptive Profile

TABLE A-1. DISTRICTS BY COUNTY

| District No. | Name | County |
|---------------------|---|---------------|
| 29 | Appoquinimink School District | New Castle |
| 31 | Brandywine School District | New Castle |
| 10 | Caesar Rodney School District | Kent |
| 17 | Cape Henlopen School District | Sussex |
| 13 | Capital School District | Kent |
| 33 | Christina School District | New Castle |
| 34 | Colonial School District | New Castle |
| 37 | Delmar School District | Sussex |
| 36 | Indian River School District | Sussex |
| 15 | Lake Forest School District | Kent |
| 16 | Laurel School District | Sussex |
| 18 | Milford School District | Kent |
| 38 | New Castle County Vo-Tech School District | New Castle |
| 39 | Polytech School District | Kent |
| 32 | Red Clay Consolidated School District | New Castle |
| 23 | Seaford School District | Sussex |
| 24 | Smyrna School District | Kent |
| 40 | Sussex Technical School District | Sussex |
| 35 | Woodbridge School District | Sussex |

TABLE A-2.

| DELAWARE ADMINISTRATION DEMOGRAPHIC CHARACTERISTICS - PRINCIPALS AND ASSISTANT PRINCIPALS | | | | | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Characteristic | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Average age | 47.5 | 47.1 | 47.2 | 46.7 | 46.2 | 46.1 | 45.4 | 45.1 | 45 |
| Male | 52% | 51% | 49% | 49% | 46% | 48% | 49% | 49% | 49% |
| African American | 23% | 22% | 23% | 22% | 22% | 24% | 23% | 23% | 25% |
| More than a Bachelors degree* | 95% | 96% | 97% | 96% | 96% | 95% | 95% | 96% | 96% |
| Delaware undergraduate college graduates* | 72% | 73% | 73% | 73% | 70% | 71% | 70% | 74% | 75% |
| Born in Delaware** | 45% | 47% | 46% | 46% | 46% | 46% | 46% | 47% | 48% |
| Average years teaching in DE | 14.1 | 13.7 | 13.7 | 13.4 | 13.1 | 12.4 | 12.0 | 12.0 | 11.9 |
| Average years in administration in DE | 4.4 | 4.8 | 5.2 | 5.4 | 5.5 | 5.7 | 5.9 | 6.2 | 6.3 |
| Average salary - 2009 \$s (thousands) | 101.9 | 101.9 | 102.7 | 103.7 | 103.3 | 103.7 | 104.0 | 101.3 | 100.1 |

** Many observations for this variable are missing.*

***Estimate based on Social Security Number.*

TABLE A-3.

| DELAWARE ADMINISTRATION DEMOGRAPHIC CHARACTERISTICS – PRINCIPALS | | | | | | | | | |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Characteristic | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Average age | 49.9 | 50.3 | 50.6 | 49.8 | 48.8 | 48.5 | 48.3 | 47.8 | 47.2 |
| Male | 52% | 51% | 48% | 50% | 48% | 48% | 46% | 45% | 47% |
| African American | 17% | 19% | 14% | 15% | 15% | 18% | 16% | 20% | 22% |
| More than a Bachelors degree | 93% | 95% | 95% | 96% | 96% | 93% | 95% | 95% | 96% |
| Delaware undergraduate college graduates | 69% | 69% | 66% | 70% | 66% | 67% | 69% | 71% | 73% |
| Born in Delaware** | 42% | 42% | 41% | 42% | 45% | 45% | 44% | 46% | 46% |
| Average years teaching in DE | 13.6 | 13.6 | 14.2 | 13.7 | 13.4 | 12.6 | 12.7 | 12.7 | 12.0 |
| Average years in administration in DE | 5.7 | 6.3 | 6.6 | 7.0 | 7.1 | 7.1 | 7.6 | 7.8 | 7.8 |
| Average salary - 2009 \$s (thousands) | 103.9 | 107.4 | 107.8 | 108.6 | 108.4 | 109.2 | 109.6 | 107.3 | 106.2 |

** Many observations for this variable are missing.*

***Estimate based on Social Security Number.*

TABLE A-4.

| DELAWARE ADMINISTRATION DEMOGRAPHIC CHARACTERISTICS – ASSISTANT PRINCIPALS | | | | | | | | | |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Characteristic | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Average age | 45.2 | 44.2 | 44.1 | 43.9 | 43.9 | 43.6 | 42.8 | 42.7 | 43 |
| Male | 52% | 50% | 50% | 48% | 45% | 48% | 51% | 52% | 52% |
| African American | 28% | 25% | 30% | 30% | 29% | 31% | 29% | 30% | 27% |
| More than a Bachelors degree | 97% | 97% | 98% | 96% | 96% | 96% | 96% | 97% | 97% |
| Delaware undergraduate college graduates | 74% | 76% | 79% | 76% | 72% | 74% | 72% | 78% | 78% |
| Born in Delaware** | 47% | 52% | 51% | 50% | 46% | 48% | 47% | 48% | 50% |
| Average years teaching in DE | 14.7 | 13.8 | 13.2 | 13.1 | 12.8 | 12.3 | 11.5 | 11.4 | 11.8 |
| Average years in administration in DE | 3.13 | 3.4 | 3.8 | 3.9 | 4.0 | 4.2 | 4.3 | 4.6 | 4.9 |
| Average salary - 2009 \$\$ (thousands) | 97.1 | 97.0 | 98.0 | 99.2 | 98.6 | 98.3 | 98.9 | 95.4 | 94.8 |

** Many observations for this variable are missing.*

***Estimate based on Social Security Number.*

TABLE A-5

| DELAWARE PRINCIPAL CHARACTERISTICS BY TYPE OF SCHOOL AND COUNTY, 2009 | | | | | | |
|--|----------------|------|-----------------------|-----------|--------------------|-------------|
| Area | Average Age | % | % African American | % Masters | % DE BA grad | % DE SSN |
| | | Male | | | | |
| Elementary | | | | | | |
| State | 48.4 | 35% | 27% | 95% | 67% | 40% |
| Kent | 47.6 | 42% | 23% | 96% | 72% | 46% |
| New Castle | 49.0 | 33% | 37% | 92% | 67% | 40% |
| Sussex | 47.8 | 30% | 5% | 100% | 57% | 35% |
| Middle | | | | | | |
| State | 43.4 | 64% | 21% | 100% | 85% | 61% |
| Kent | 42.7 | 57% | 29% | 100% | 100% | 71% |
| New Castle | 44.1 | 76% | 29% | 100% | 75% | 59% |
| Sussex | 42.8 | 44% | 0% | 100% | 89% | 56% |
| Secondary | | | | | | |
| State | 46.6 | 68% | 18% | 100% | 83% | 50% |
| Kent | 53.5 | 50% | 0% | 100% | 100% | 50% |
| New Castle | 46.3 | 59% | 23% | 100% | 93% | 53% |
| Sussex | 43.3 | 100% | 14% | 100% | 40% | 43% |

TABLE A-6

| DELAWARE ASSISTANT PRINCIPAL CHARACTERISTICS BY TYPE OF SCHOOL AND COUNTY, 2009 | | | | | | |
|--|-------------|------|--------------------|-----------|--------------|----------|
| Area | Average Age | % | % African American | % Masters | % DE BA grad | % DE SSN |
| | | Male | | | | |
| Elementary | | | | | | |
| State | 44.4 | 31% | 21% | 96% | 71% | 52% |
| Kent | 42.9 | 23% | 18% | 100% | 100% | 59% |
| New Castle | 44.8 | 35% | 28% | 92% | 82% | 59% |
| Sussex | 45.4 | 31% | 12% | 100% | 40% | 31% |
| Middle | | | | | | |
| State | 43.6 | 56% | 30% | 100% | 78% | 47% |
| Kent | 43.4 | 44% | 33% | 100% | 80% | 44% |
| New Castle | 44.0 | 54% | 42% | 100% | 92% | 50% |
| Sussex | 42.8 | 70% | 0% | 6% | 50% | 40% |
| Secondary | | | | | | |
| State | 41.7 | 68% | 38% | 100% | 83% | 54% |
| Kent | 40.9 | 73% | 22% | 100% | 86% | 26% |
| New Castle | 41.5 | 63% | 44% | 100% | 87% | 65% |
| Sussex | 43.1 | 77% | 23% | 100% | 75% | 46% |

TABLE A-7

| DELAWARE ADMINISTRATION DEMOGRAPHIC CHARACTERISTICS - NEW PRINCIPALS | | | | | | | | | | | | | |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Characteristic | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Average age | 44 | 46 | 46 | 49 | 46 | 46 | 48 | 50 | 43 | 43 | 45 | 45 | 43 |
| Male | 31% | 43% | 65% | 48% | 43% | 53% | 52% | 34% | 52% | 58% | 46% | 35% | 52% |
| African American | 31% | 14% | 35% | 9% | 11% | 21% | 24% | 9% | 13% | 23% | 24% | 22% | 35% |
| More than a Bachelors degree | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Delaware undergraduate college graduates | 71% | 50% | 42% | 75% | 88% | 81% | 73% | 56% | 88% | 67% | 79% | 79% | 67% |
| Born in Delaware** | 31% | 65% | 20% | 44% | 52% | 81% | 44% | 35% | 49% | 49% | 36% | 39% | 57% |
| Average years teaching in DE | 12.4 | 12.1 | 14.9 | 22.1 | 19.1 | 13.4 | 11.5 | 15.3 | 11.1 | 13.7 | 10.2 | 12.6 | 12.8 |
| Average years prior admin. in DE | 9.4 | 8.4 | 7.8 | 7.6 | 8.2 | 7.1 | 6.8 | 6.4 | 7.3 | 6.3 | 5.0 | 5.4 | 4.4 |
| Average salary - 2009 \$s (thousands) | not avail. | not avail. | not avail. | not avail. | not avail. | 100.1 | 102.6 | 105.1 | 103.3 | 103.5 | 106.1 | 103.7 | 105.0 |
| N | 13 | 14 | 20 | 23 | 28 | 38 | 25 | 32 | 31 | 31 | 37 | 23 | 31 |

TABLE A-8

| DELAWARE ADMINISTRATION DEMOGRAPHIC CHARACTERISTICS - NEW ASSISTANT PRINCIPALS | | | | | | | | | | | | | |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Characteristic | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Average age | 43 | 45 | 45 | 38 | 42 | 43 | 41 | 42 | 39 | 40 | 39 | 39 | 39 |
| Male | 40% | 58% | 58% | 52% | 48% | 49% | 45% | 41% | 48% | 40% | 55% | 56% | 51% |
| African American | 15% | 16% | 32% | 10% | 30% | 28% | 28% | 34% | 20% | 16% | 34% | 33% | 17% |
| More than a Bachelors degree | 100% | 100% | 100% | 100% | 100% | 94% | 97% | 100% | 91% | 97% | 97% | not avail. | not avail. |
| Delaware undergraduate college graduates | 83% | 89% | 100% | 88% | 68% | 67% | 85% | 86% | 74% | 63% | 87% | not avail. | not avail. |
| Born in Delaware** | 50% | 42% | 56% | 40% | 45% | 49% | 68% | 48% | 45% | 35% | 58% | 51% | 54% |
| Average years teaching in DE | 13.5 | 14.7 | 17.2 | 11.4 | 15.3 | 13.4 | 11.7 | 11.5 | 10.4 | 11.0 | 9.9 | 9.6 | 12.4 |
| Average salary - 2009 \$s (thousands) | 48,284 | 48,340 | 49,097 | 49,711 | 49,842 | 48,124 | 47,847 | 48,466 | 48,194 | 48,599 | 48,001 | 49,531 | 49,812 |
| N | 20 | 19 | 19 | 42 | 54 | 47 | 40 | 29 | 44 | 43 | 38 | 39 | 35 |

TABLE A-9

| NEW PRINCIPALS BY SCHOOL CATEGORY, 1996-2008 | | | | | | | | | | | | | |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Category | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Adult | n/a | n/a | n/a | 33% | 0% | 0% | 0% | 0% | 0% | 0% | 25% | 0% | 0% |
| Alternative | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 50% | 0% | 0% | 0% | 0% |
| Early Childhood | n/a | n/a | 0% | 0% | 0% | 0% | 0% | 33% | 25% | 0% | 0% | 0% | 50% |
| Grades 1 - 12 | 0% | 0% | 50% | 0% | 0% | 25% | 33% | 17% | 0% | 50% | 29% | 13% | 0% |
| Elementary | 15% | 13% | 12% | 10% | 15% | 15% | 13% | 20% | 18% | 15% | 15% | 11% | 18% |
| Secondary | 4% | 9% | 16% | 12% | 22% | 18% | 14% | 14% | 7% | 14% | 32% | 13% | 6% |
| Middle | 5% | 5% | 17% | 34% | 21% | 48% | 19% | 13% | 16% | 21% | 21% | 16% | 18% |
| Middle and High | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 0% | 50% |
| Special | 0% | 20% | 11% | 0% | 14% | 13% | 13% | 22% | 22% | 11% | 11% | 22% | 33% |
| Vocational | 0% | 0% | 33% | 33% | 33% | 33% | 0% | 0% | 33% | 33% | 33% | 0% | 0% |
| TOTAL | 10% | 11% | 14% | 15% | 17% | 21% | 14% | 17% | 16% | 16% | 19% | 12% | 16% |

TABLE A-10

| # OF SCHOOLS BY SCHOOL CATEGORY, 1996-2008 | | | | | | | | | | | | | |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Category | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Adult | 0 | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 4 | 1 | 4 | 5 | 5 |
| Alternative | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Early Childhood | 0 | 0 | 1 | 2 | 3 | 4 | 3 | 3 | 4 | 3 | 3 | 3 | 2 |
| Grades 1 - 12 | 1 | 1 | 2 | 2 | 2 | 4 | 3 | 6 | 6 | 6 | 7 | 8 | 7 |
| Elementary | 72 | 72 | 78 | 84 | 92 | 98 | 102 | 102 | 102 | 103 | 102 | 101 | 101 |
| Secondary | 24 | 23 | 25 | 26 | 27 | 28 | 28 | 28 | 28 | 28 | 31 | 31 | 31 |
| Middle | 21 | 22 | 24 | 29 | 29 | 29 | 31 | 32 | 32 | 33 | 33 | 31 | 33 |
| Middle and High | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| Special | 8 | 10 | 9 | 8 | 7 | 8 | 8 | 9 | 9 | 9 | 9 | 9 | 9 |
| Vocational | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| TOTAL | 130 | 132 | 143 | 158 | 168 | 179 | 183 | 188 | 190 | 188 | 194 | 196 | 196 |

NOTE: Numbers are reflected of the administrative data for Principals and Assistant Principals. There may be some missing data in some categories.

TABLE A-11

| Number of Position Moves for Principals by Year Started as Principal 1996-2008 | | | | | |
|---|-----------------|-----|-----|-----|----|
| First Year as Principal | Number of Moves | | | | |
| | 0 | 1 | 2 | 3 | 4 |
| 1996-2008 | 15% | 31% | 15% | 31% | 8% |
| 1997-2008 | 43% | 43% | 14% | 0% | 0% |
| 1998-2008 | 40% | 45% | 15% | 0% | 0% |
| 1999-2008 | 43% | 30% | 22% | 4% | 0% |
| 2000-2008 | 36% | 36% | 29% | 0% | 0% |
| 2001-2008 | 47% | 45% | 8% | 0% | 0% |
| 2002-2008 | 40% | 52% | 8% | 0% | 0% |
| 2003-2008 | 53% | 38% | 9% | 0% | 0% |
| 2004-2008 | 47% | 47% | 7% | 0% | 0% |
| 2005-2008 | 56% | 34% | 9% | 0% | 0% |
| 2006-2008 | 72% | 28% | 0% | 0% | 0% |
| 2007-2008 | 83% | 17% | 0% | 0% | 0% |
| 2008-2008 | 100% | 0% | 0% | 0% | 0% |

TABLE A-12

| NEW ASSISTANT PRINCIPALS BY SCHOOL CATEGORY, 1996-2008 | | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Category | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Adult | n/a | n/a | n/a | 33% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 20% | 0% |
| Alternative | 0% | 0% | 0% | 0% | 50% | 50% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Early Childhood | n/a | n/a | 0% | 50% | 0% | 25% | 0% | 0% | 0% | 0% | 33% | 0% | 50% |
| Grades 1 - 12 | 0% | 0% | 0% | 0% | 50% | 25% | 67% | 33% | 33% | 33% | 43% | 0% | 14% |
| Elementary | 10% | 6% | 12% | 13% | 22% | 17% | 17% | 9% | 21% | 13% | 7% | 15% | 10% |
| Secondary | 29% | 39% | 28% | 46% | 70% | 39% | 46% | 21% | 36% | 46% | 55% | 45% | 39% |
| Middle | 24% | 23% | 8% | 45% | 31% | 45% | 19% | 25% | 25% | 33% | 24% | 19% | 24% |
| Middle and High | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 0% | 0% |
| Special | 13% | 0% | 11% | 0% | 14% | 25% | 13% | 11% | 11% | 33% | 11% | 22% | 33% |
| Vocational | 0% | 33% | 0% | 133% | 100% | 0% | 33% | 100% | 67% | 33% | 33% | 25% | 0% |
| TOTAL | 15% | 14% | 13% | 27% | 32% | 26% | 22% | 15% | 23% | 23% | 20% | 20% | 18% |

TABLE A-13

| Number of Position Moves for Assistant Principals by Year Started as Assistant Principal | | | | | |
|---|------------------------|----------|----------|----------|----------|
| First Year as Assistant Principal | Number of Moves | | | | |
| | 0 | 1 | 2 | 3 | 4 |
| 1996-2008 | 65% | 15% | 20% | 0% | 0% |
| 1997-2008 | 79% | 16% | 5% | 0% | 0% |
| 1998-2008 | 47% | 26% | 11% | 0% | 16% |
| 1999-2008 | 50% | 36% | 5% | 5% | 5% |
| 2000-2008 | 50% | 37% | 11% | 2% | 0% |
| 2001-2008 | 60% | 32% | 4% | 2% | 2% |
| 2002-2008 | 43% | 40% | 13% | 5% | 0% |
| 2003-2008 | 76% | 24% | 0% | 0% | 0% |
| 2004-2008 | 80% | 20% | 0% | 0% | 0% |
| 2005-2008 | 72% | 21% | 7% | 0% | 0% |
| 2006-2008 | 92% | 8% | 0% | 0% | 0% |
| 2007-2008 | 82% | 18% | 0% | 0% | 0% |
| 2008-2008 | 89% | 11% | 0% | 0% | 0% |

APPENDIX B

Statistical Output

TENURE AS A PRINCIPAL – LINEAR MODEL

The REG Procedure

Model: MODEL1

Dependent Variable: timein

| | |
|--|------|
| Number of Observations Read | 1288 |
| Number of Observations Used | 955 |
| Number of Observations with Missing Values | 333 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|-----------------|-----|----------------|-------------|---------|--------|
| Model | 22 | 2965.55961 | 134.79816 | 39.86 | <.0001 |
| Error | 932 | 3151.70112 | 3.38165 | | |
| Corrected Total | 954 | 6117.26073 | | | |

| | | | |
|----------------|----------|-----------------|---------------|
| Root MSE | 1.83893 | R-Square | 0.4848 |
| Dependent Mean | 3.78115 | <i>Adj R-Sq</i> | <i>0.4726</i> |
| Coeff Var | 48.63405 | | |

Parameter Estimates

| Variable | Label | DF | Parameter Estimate | Standard Error | t Value | Pr > t | Variance Inflation |
|---------------------|---------------------|----------|--------------------|-------------------|--------------|------------------|--------------------|
| Intercept | Intercept | 1 | -11.30073 | 2.32593 | -4.86 | <.0001 | 0 |
| <i>age</i> | <i>age</i> | <i>1</i> | <i>0.18832</i> | <i>0.09153</i> | <i>2.06</i> | <i>0.0399</i> | <i>161.91477</i> |
| age2 | age2 | 1 | -0.00106 | 0.00093993 | -1.13 | 0.2603 | 155.47020 |
| <i>male</i> | <i>male</i> | <i>1</i> | <i>0.39362</i> | <i>0.14016</i> | <i>2.81</i> | <i>0.0051</i> | <i>1.38021</i> |
| AfAm | AfAm | 1 | 0.07809 | 0.16475 | 0.47 | 0.6356 | 1.08496 |
| <i>totadminexp</i> | <i>totadminexp</i> | <i>1</i> | <i>0.38540</i> | <i>0.02047</i> | <i>18.83</i> | <i><.0001</i> | <i>1.20149</i> |
| <i>detchexp</i> | <i>detchexp</i> | <i>1</i> | <i>-0.03512</i> | <i>0.01117</i> | <i>-3.14</i> | <i>0.0017</i> | <i>1.77132</i> |
| salary1000 | | 1 | 0.00378 | 0.01083 | 0.35 | 0.7267 | 3.06145 |
| <i>moves</i> | <i>moves</i> | <i>1</i> | <i>1.13204</i> | <i>0.10631</i> | <i>10.65</i> | <i><.0001</i> | <i>1.15345</i> |
| Middle | Middle | 1 | 0.02201 | 0.21806 | 0.10 | 0.9196 | 2.31927 |
| <i>HighSchool1</i> | <i>HighSchool1</i> | <i>1</i> | <i>0.70395</i> | <i>0.28097</i> | <i>2.51</i> | <i>0.0124</i> | <i>3.26206</i> |
| Kent | Kent | 1 | 0.25269 | 0.25166 | 1.00 | 0.3156 | 3.33715 |
| Sussex | Sussex | 1 | 0.08178 | 0.28172 | 0.29 | 0.7717 | 3.80524 |
| teacher_students | teacher_students | 1 | 0.00675 | 0.01699 | 0.40 | 0.6912 | 1.09824 |
| students | students | 1 | -0.00029331 | 0.00025642 | -1.14 | 0.2530 | 2.43393 |
| TSUSP | TSUSP | 1 | -0.01026 | 0.00804 | -1.28 | 0.2024 | 2.89845 |
| <i>freelunch</i> | <i>freelunch</i> | <i>1</i> | <i>1.60083</i> | <i>0.59679</i> | <i>2.68</i> | <i>0.0074</i> | <i>2.67520</i> |
| minority | minority | 1 | -0.00545 | 0.00511 | -1.07 | 0.2861 | 2.36142 |
| Tspec | Tspec | 1 | -0.02654 | 0.02080 | -1.28 | 0.2023 | 1.53964 |
| <i>math</i> | <i>math</i> | <i>1</i> | <i>0.01793</i> | <i>0.00600</i> | <i>2.99</i> | <i>0.0029</i> | <i>3.41618</i> |
| <i>expenditures</i> | <i>expenditures</i> | <i>1</i> | <i>0.00021388</i> | <i>0.00004149</i> | <i>5.15</i> | <i><.0001</i> | <i>1.36445</i> |
| schools | schools | 1 | 0.00982 | 0.01144 | 0.86 | 0.3909 | 2.67528 |
| <i>adminpercent</i> | <i>adminpercent</i> | <i>1</i> | <i>0.18255</i> | <i>0.05913</i> | <i>3.09</i> | <i>0.0021</i> | <i>1.36165</i> |

TENURE AS A PRINCIPAL AT SAME LOCATION – LINEAR MODEL

The REG Procedure
Model: MODEL1
Dependent Variable: timethere

| | |
|--|------|
| Number of Observations Read | 1288 |
| Number of Observations Used | 955 |
| Number of Observations with Missing Values | 333 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|-----------------|-----|----------------|-------------|---------|--------|
| Model | 22 | 1602.79050 | 72.85411 | 22.31 | <.0001 |
| Error | 932 | 3044.14772 | 3.26625 | | |
| Corrected Total | 954 | 4646.93822 | | | |

| | | | |
|----------------|----------|-----------------|---------------|
| Root MSE | 1.80728 | R-Square | 0.3449 |
| Dependent Mean | 3.22199 | <i>Adj R-Sq</i> | 0.3294 |
| Coeff Var | 56.09198 | | |

Parameter Estimates

| Variable | Label | DF | Parameter Estimate | Standard Error | t Value | Pr > t | Variance Inflation |
|---------------------|---------------------|----------|--------------------|-------------------|--------------|------------------|--------------------|
| Intercept | Intercept | 1 | -10.41884 | 2.28590 | -4.56 | <.0001 | 0 |
| age | age | 1 | 0.18503 | 0.08995 | 2.06 | 0.0400 | 161.91477 |
| age2 | age2 | 1 | -0.00104 | 0.00092375 | -1.12 | 0.2617 | 155.47020 |
| male | male | 1 | 0.44141 | 0.13775 | 3.20 | 0.0014 | 1.38021 |
| AfAm | AfAm | 1 | 0.00553 | 0.16191 | 0.03 | 0.9728 | 1.08496 |
| totadminexp | totadminexp | 1 | 0.28884 | 0.02012 | 14.36 | <.0001 | 1.20149 |
| detchexp | detchexp | 1 | -0.02200 | 0.01098 | -2.00 | 0.0455 | 1.77132 |
| salary1000 | | 1 | 0.01525 | 0.01064 | 1.43 | 0.1521 | 3.06145 |
| moves | moves | 1 | -0.60860 | 0.10448 | -5.82 | <.0001 | 1.15345 |
| Middle | Middle | 1 | 0.21307 | 0.21431 | 0.99 | 0.3204 | 2.31927 |
| HighSchool | HighSchool | 1 | 0.68116 | 0.27613 | 2.47 | 0.0138 | 3.26206 |
| Kent | Kent | 1 | 0.20982 | 0.24733 | 0.85 | 0.3965 | 3.33715 |
| Sussex | Sussex | 1 | -0.00032336 | 0.27687 | -0.00 | 0.9991 | 3.80524 |
| teacher_students | teacher_students | 1 | 0.00429 | 0.01670 | 0.26 | 0.7972 | 1.09824 |
| students | students | 1 | -0.00040794 | 0.00025200 | -1.62 | 0.1058 | 2.43393 |
| TSUSP | TSUSP | 1 | -0.01869 | 0.00791 | -2.36 | 0.0183 | 2.89845 |
| freelunch | freelunch | 1 | 1.05252 | 0.58652 | 1.79 | 0.0731 | 2.67520 |
| minority | minority | 1 | -0.00296 | 0.00502 | -0.59 | 0.5549 | 2.36142 |
| Tspec | Tspec | 1 | -0.00618 | 0.02044 | -0.30 | 0.7624 | 1.53964 |
| math | math | 1 | 0.01709 | 0.00589 | 2.90 | 0.0038 | 3.41618 |
| expenditures | expenditures | 1 | 0.00017136 | 0.00004078 | 4.20 | <.0001 | 1.36445 |
| schools | schools | 1 | 0.00227 | 0.01124 | 0.20 | 0.8397 | 2.67528 |
| adminpercent | adminpercent | 1 | 0.07970 | 0.05812 | 1.37 | 0.1706 | 1.36165 |

TENURE AS A PRINCIPAL – LOG-LINEAR MODEL

The REG Procedure
Model: MODEL1
Dependent Variable: timein1

| | |
|--|------|
| Number of Observations Read | 1288 |
| Number of Observations Used | 955 |
| Number of Observations with Missing Values | 333 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|-----------------|-----|-------------------|----------------|---------|--------|
| Model | 22 | 214.22274 | 9.73740 | 33.36 | <.0001 |
| Error | 932 | 272.02318 | 0.29187 | | |
| Corrected Total | 954 | 486.24591 | | | |

| | | | |
|----------------|----------|-----------------|---------------|
| Root MSE | 0.54025 | R-Square | 0.4406 |
| Dependent Mean | 1.09382 | <i>Adj R-Sq</i> | <i>0.4274</i> |
| Coeff Var | 49.39137 | | |

Parameter Estimates

| Variable | Label | DF | Parameter Estimate | Standard Error | t Value | Pr > t | Variance Inflation |
|---------------------|---------------------|----------|-----------------------|-------------------|--------------|------------------|-----------------------|
| <i>Intercept</i> | <i>Intercept</i> | <i>1</i> | <i>-3.49744</i> | <i>0.68333</i> | <i>-5.12</i> | <i><.0001</i> | <i>0</i> |
| <i>age</i> | <i>age</i> | <i>1</i> | <i>0.06876</i> | <i>0.02689</i> | <i>2.56</i> | <i>0.0107</i> | <i>161.91477</i> |
| age2 | age2 | 1 | -0.00046347 | 0.00027614 | -1.68 | 0.0936 | 155.47020 |
| <i>male</i> | <i>male</i> | <i>1</i> | <i>0.08608</i> | <i>0.04118</i> | <i>2.09</i> | <i>0.0368</i> | <i>1.38021</i> |
| AfAm | AfAm | 1 | -0.02079 | 0.04840 | -0.43 | 0.6677 | 1.08496 |
| <i>totadminexp</i> | <i>totadminexp</i> | <i>1</i> | <i>0.10161</i> | <i>0.00601</i> | <i>16.90</i> | <i><.0001</i> | <i>1.20149</i> |
| <i>detchexp</i> | <i>detchexp</i> | <i>1</i> | <i>-0.01104</i> | <i>0.00328</i> | <i>-3.36</i> | <i>0.0008</i> | <i>1.77132</i> |
| salary1000 | | 1 | 0.00398 | 0.00318 | 1.25 | 0.2110 | 3.06145 |
| <i>moves</i> | <i>moves</i> | <i>1</i> | <i>0.28990</i> | <i>0.03123</i> | <i>9.28</i> | <i><.0001</i> | <i>1.15345</i> |
| Middle | Middle | 1 | -0.03123 | 0.06406 | -0.49 | 0.6260 | 2.31927 |
| HighSchool | HighSchool | 1 | 0.13600 | 0.08254 | 1.65 | 0.0998 | 3.26206 |
| Kent | Kent | 1 | 0.13668 | 0.07393 | 1.85 | 0.0648 | 3.33715 |
| Sussex | Sussex | 1 | 0.09914 | 0.08277 | 1.20 | 0.2313 | 3.80524 |
| teacher_students | teacher_students | 1 | 0.00288 | 0.00499 | 0.58 | 0.5634 | 1.09824 |
| students | students | 1 | -0.00009446 | 0.00007533 | -1.25 | 0.2102 | 2.43393 |
| TSUSP | TSUSP | 1 | -0.00158 | 0.00236 | -0.67 | 0.5030 | 2.89845 |
| freelunch | freelunch | 1 | 0.26439 | 0.17533 | 1.51 | 0.1319 | 2.67520 |
| minority | minority | 1 | -0.00161 | 0.00150 | -1.07 | 0.2832 | 2.36142 |
| Tspec | Tspec | 1 | -0.00900 | 0.00611 | -1.47 | 0.1409 | 1.53964 |
| math | math | 1 | 0.00359 | 0.00176 | 2.04 | 0.0417 | 3.41618 |
| <i>expenditures</i> | <i>expenditures</i> | <i>1</i> | <i>0.00006277</i> | <i>0.00001219</i> | <i>5.15</i> | <i><.0001</i> | <i>1.36445</i> |
| schools | schools | 1 | 0.00230 | 0.00336 | 0.69 | 0.4929 | 2.67528 |
| <i>adminpercent</i> | <i>adminpercent</i> | <i>1</i> | <i>0.03769</i> | <i>0.01737</i> | <i>2.17</i> | <i>0.0303</i> | <i>1.36165</i> |

TENURE AS A PRINCIPAL AT SAME LOCATION – LOG-LINEAR MODEL

The REG Procedure
Model: MODEL1
Dependent Variable: timethere1

| | |
|--|------|
| Number of Observations Read | 1288 |
| Number of Observations Used | 955 |
| Number of Observations with Missing Values | 333 |

Analysis of Variance

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|-----------------|-----|----------------|-------------|---------|--------|
| Model | 22 | 136.63071 | 6.21049 | 18.26 | <.0001 |
| Error | 932 | 316.93553 | 0.34006 | | |
| Corrected Total | 954 | 453.56623 | | | |

| | | | |
|----------------|----------|-----------------|---------------|
| Root MSE | 0.58315 | R-Square | 0.3012 |
| Dependent Mean | 0.94024 | <i>Adj R-Sq</i> | 0.2847 |
| Coeff Var | 62.02070 | | |

Parameter Estimates

| Variable | Label | DF | Parameter Estimate | Standard Error | t Value | Pr > t | Variance Inflation |
|---------------------|---------------------|----------|--------------------|-------------------|--------------|------------------|--------------------|
| Intercept | Intercept | 1 | -3.73239 | 0.73758 | -5.06 | <.0001 | 0 |
| age | age | 1 | 0.08029 | 0.02903 | 2.77 | 0.0058 | 161.91477 |
| age2 | age2 | 1 | -0.00056829 | 0.00029806 | -1.91 | 0.0569 | 155.47020 |
| male | male | 1 | 0.09132 | 0.04445 | 2.05 | 0.0402 | 1.38021 |
| AfAm | AfAm | 1 | -0.01533 | 0.05224 | -0.29 | 0.7693 | 1.08496 |
| totadminexp | totadminexp | 1 | 0.08210 | 0.00649 | 12.65 | <.0001 | 1.20149 |
| detchexp | detchexp | 1 | -0.00874 | 0.00354 | -2.47 | 0.0138 | 1.77132 |
| salary1000 | | 1 | 0.00606 | 0.00343 | 1.77 | 0.0776 | 3.06145 |
| moves | moves | 1 | -0.18035 | 0.03371 | -5.35 | <.0001 | 1.15345 |
| Middle | Middle | 1 | 0.06233 | 0.06915 | 0.90 | 0.3676 | 2.31927 |
| HighSchool | HighSchool | 1 | 0.16040 | 0.08910 | 1.80 | 0.0721 | 3.26206 |
| Kent | Kent | 1 | 0.14387 | 0.07981 | 1.80 | 0.0717 | 3.33715 |
| Sussex | Sussex | 1 | 0.08089 | 0.08934 | 0.91 | 0.3655 | 3.80524 |
| teacher_students | teacher_students | 1 | 0.00228 | 0.00539 | 0.42 | 0.6722 | 1.09824 |
| students | students | 1 | -0.00009500 | 0.00008131 | -1.17 | 0.2430 | 2.43393 |
| TSUSP | TSUSP | 1 | -0.00441 | 0.00255 | -1.73 | 0.0843 | 2.89845 |
| freelunch | freelunch | 1 | 0.23148 | 0.18925 | 1.22 | 0.2216 | 2.67520 |
| minority | minority | 1 | -0.00088822 | 0.00162 | -0.55 | 0.5835 | 2.36142 |
| Tspec | Tspec | 1 | -0.00510 | 0.00660 | -0.77 | 0.4391 | 1.53964 |
| math | math | 1 | 0.00407 | 0.00190 | 2.14 | 0.0328 | 3.41618 |
| expenditures | expenditures | 1 | 0.00005523 | 0.00001316 | 4.20 | <.0001 | 1.36445 |
| schools | schools | 1 | 0.00030383 | 0.00363 | 0.08 | 0.9333 | 2.67528 |
| adminpercent | adminpercent | 1 | 0.01808 | 0.01875 | 0.96 | 0.3351 | 1.3616 |

STAYED VS. EVERYONE ELSE (ALL DEP)

The LOGISTIC Procedure Model Information

| | |
|-----------------------------|------------------|
| Data Set | WORK.STAYEDSAME1 |
| Response Variable | stayedsame |
| Number of Response Levels | 2 |
| Model | binary cloglog |
| Optimization Technique | Newton-Raphson |
| Number of Observations Read | 1288 |
| Number of Observations Used | 955 |

| Response Profile | | |
|------------------|------------|-----------------|
| Ordered Value | stayedsame | Total Frequency |
| 1 | 0 | 197 |
| 2 | 1 | 758 |

Probability modeled is stayedsame=0.

NOTE: 333 observations were deleted due to missing values for the response or explanatory variables.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

| Criterion | Model Fit Statistics | |
|-----------|----------------------|-----------------|
| | Without Covariates | With Covariates |
| AIC | 1696.718 | 669.312 |
| SC | 1696.718 | 834.610 |
| -2 Log L | 1696.718 | 601.312 |

Testing Global Null Hypothesis: BETA=0

| Test | Chi-Square | DF | Pr > ChiSq |
|------------------|------------|----|------------|
| Likelihood Ratio | 1095.4058 | 34 | <.0001 |
| Score | 604.5171 | 34 | <.0001 |
| Wald | 340.4488 | 34 | <.0001 |

Type 3 Analysis of Effects

| Effect | DF | Wald | |
|--------------------|----------|-----------------|------------------|
| | | Chi-Square | Pr > ChiSq |
| age | 1 | 0.4754 | 0.4905 |
| male | 1 | 0.8376 | 0.3601 |
| AfAm | 1 | 3.0446 | 0.0810 |
| totadminexp | 1 | 90.5156 | <.0001 |
| detchexp | 1 | 1.6947 | 0.1930 |
| salary1000 | 1 | 4.6931 | 0.0303 |
| moves | 1 | 204.3971 | <.0001 |
| Middle | 1 | 0.0833 | 0.7729 |
| HighSchool | 1 | 1.2172 | 0.2699 |
| Kent | 1 | 9.5786 | 0.0020 |
| Sussex | 1 | 3.8807 | 0.0488 |
| teacher_students | 1 | 0.5575 | 0.4553 |
| students | 1 | 4.4512 | 0.0349 |
| TSUSP | 1 | 0.9867 | 0.3205 |
| freelunch | 1 | 0.5275 | 0.4676 |

| | | | |
|------------------|-----------|----------------|------------------|
| minority | 1 | 1.1842 | 0.2765 |
| Tspec | 1 | 4.7040 | 0.0301 |
| math | 1 | 0.7850 | 0.3756 |
| expenditures | 1 | 1.3672 | 0.2423 |
| schools | 1 | 0.0200 | 0.8877 |
| adminpercent | 1 | 2.0828 | 0.1490 |
| timethere | 13 | 81.3852 | <.0001 |

Analysis of Maximum Likelihood Estimates

| Parameter | DF | Estimate | Standard Error | Wald Chi-Square | Pr > ChiSq | Odds Ratio |
|--------------------|-----------|-----------------|-----------------|-----------------|------------------|--------------|
| age | 1 | 0.00897 | 0.0130 | 0.4754 | 0.4905 | |
| male | 1 | 0.1840 | 0.2011 | 0.8376 | 0.3601 | |
| AfAm | 1 | -0.4177 | 0.2394 | 3.0446 | 0.0810 | |
| totadminexp | 1 | -0.3554 | 0.0374 | 90.5156 | <.0001 | 0.7 |
| detchexp | 1 | 0.0188 | 0.0145 | 1.6947 | 0.1930 | |
| salary1000 | 1 | -0.0311 | 0.0144 | 4.6931 | 0.0303 | 0.969 |
| moves | 1 | 2.3134 | 0.1618 | 204.3971 | <.0001 | 10.1 |
| Middle | 1 | -0.0866 | 0.3001 | 0.0833 | 0.7729 | |
| HighSchool | 1 | -0.4806 | 0.4356 | 1.2172 | 0.2699 | |
| Kent | 1 | -1.0970 | 0.3544 | 9.5786 | 0.0020 | 0.3 |
| Sussex | 1 | -0.7888 | 0.4004 | 3.8807 | 0.0488 | 0.5 |
| teacher_students | 1 | -0.0371 | 0.0497 | 0.5575 | 0.4553 | |
| students | 1 | 0.000689 | 0.000327 | 4.4512 | 0.0349 | 1.0 |
| TSUSP | 1 | 0.0103 | 0.0103 | 0.9867 | 0.3205 | |
| freelunch | 1 | 0.6164 | 0.8486 | 0.5275 | 0.4676 | |
| minority | 1 | -0.00779 | 0.00716 | 1.1842 | 0.2765 | |
| Tspec | 1 | 0.0634 | 0.0292 | 4.7040 | 0.0301 | 1.1 |
| math | 1 | -0.00766 | 0.00864 | 0.7850 | 0.3756 | |
| expenditures | 1 | -0.00007 | 0.000059 | 1.3672 | 0.2423 | |
| schools | 1 | -0.00219 | 0.0155 | 0.0200 | 0.8877 | |
| adminpercent | 1 | -0.1266 | 0.0877 | 2.0828 | 0.1490 | |
| timethere | 1 | 3.5152 | 1.9944 | 3.1067 | 0.0780 | |
| timethere | 2 | 3.9625 | 2.0045 | 3.9076 | 0.0481 | |
| timethere | 3 | 4.7476 | 2.0435 | 5.3975 | 0.0202 | |
| timethere | 4 | 5.1687 | 2.0564 | 6.3176 | 0.0120 | |
| timethere | 5 | 5.5512 | 2.0621 | 7.2468 | 0.0071 | |
| timethere | 6 | 5.4926 | 2.1023 | 6.8262 | 0.0090 | |
| timethere | 7 | 6.1725 | 2.1507 | 8.2368 | 0.0041 | |
| timethere | 8 | 6.9953 | 2.1576 | 10.5113 | 0.0012 | |
| timethere | 9 | 6.4024 | 2.2712 | 7.9466 | 0.0048 | |
| timethere | 10 | 8.4519 | 2.2416 | 14.2164 | 0.0002 | |
| timethere | 11 | -5.2620 | 1014.6 | 0.0000 | 0.9959 | |
| timethere | 12 | -5.9755 | 1234.1 | 0.0000 | 0.9961 | |
| timethere | 13 | 9.2004 | 2456.0 | 0.0000 | 0.9970 | |

Association of Predicted Probabilities and Observed Responses

| | | | |
|--------------------|--------|-----------|-------|
| Percent Concordant | 88.0 | Somers' D | 0.763 |
| Percent Discordant | 11.8 | Gamma | 0.764 |
| Percent Tied | 0.2 | Tau-a | 0.250 |
| Pairs | 149326 | c | 0.881 |

STAYED VS. MOVED WITHIN DISTRICT AS A PRINCIPAL (SAME DIST)

The LOGISTIC Procedure Model Information

| | |
|-----------------------------|------------------|
| Data Set | WORK.STAYEDSAME3 |
| Response Variable | stayedsame |
| Number of Response Levels | 2 |
| Model | binary cloglog |
| Optimization Technique | Newton-Raphson |
| Number of Observations Read | 1088 |
| Number of Observations Used | 797 |

Response Profile

| Ordered Value | stayedsame | Total Frequency |
|---------------|------------|-----------------|
| 1 | 0 | 39 |
| 2 | 1 | 758 |

Probability modeled is stayedsame=0.

NOTE: 291 observations were deleted due to missing values for the response or explanatory variables.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

| Criterion | Without Covariates | With Covariates |
|-----------|--------------------|-----------------|
| AIC | 1551.777 | 198.182 |
| SC | 1551.777 | 329.246 |
| -2 Log L | 1551.777 | 142.182 |

Testing Global Null Hypothesis: BETA=0

| Test | Chi-Square | DF | Pr > ChiSq |
|------------------|------------|----|------------|
| Likelihood Ratio | 1409.5945 | 28 | <.0001 |
| Score | 712.3805 | 28 | <.0001 |
| Wald | 131.3777 | 28 | <.0001 |

Type 3 Analysis of Effects

| Effect | DF | Wald Chi-Square | Pr > ChiSq |
|--------------------|----------|-----------------|------------------|
| age | 1 | 7.1698 | 0.0074 |
| male | 1 | 0.0558 | 0.8132 |
| AfAm | 1 | 6.4971 | 0.0108 |
| totadminexp | 1 | 6.8111 | 0.0091 |
| detchexp | 1 | 4.0847 | 0.0433 |
| salary1000 | 1 | 4.7355 | 0.0295 |
| moves | 1 | 61.7221 | <.0001 |
| Middle | 1 | 0.0238 | 0.8774 |
| HighSchool | 1 | 2.9980 | 0.0834 |
| Kent | 1 | 8.0051 | 0.0047 |
| Sussex | 1 | 3.5578 | 0.0593 |
| teacher_students | 1 | 0.4162 | 0.5188 |

| | | | |
|------------------|----------|----------------|---------------|
| students | 1 | 0.1126 | 0.7373 |
| TSUSP | 1 | 4.1413 | 0.0418 |
| freelunch | 1 | 0.0001 | 0.9939 |
| minority | 1 | 0.0011 | 0.9738 |
| Tspec | 1 | 10.5541 | 0.0012 |
| math | 1 | 0.5044 | 0.4776 |
| expenditures | 1 | 0.5714 | 0.4497 |
| schools | 1 | 0.4378 | 0.5082 |
| adminpercent | 1 | 1.8033 | 0.1793 |
| timethere | 7 | 19.3944 | 0.0070 |

Analysis of Maximum Likelihood Estimates

| Parameter | DF | Estimate | Standard Error | Wald Chi-Square | Pr > ChiSq | Odds Ratios |
|--------------------|----------|----------------|----------------|-----------------|------------------|-------------|
| age | 1 | -0.1099 | 0.0410 | 7.1698 | 0.0074 | 0.9 |
| male | 1 | -0.1230 | 0.5206 | 0.0558 | 0.8132 | |
| AfAm | 1 | -1.8084 | 0.7095 | 6.4971 | 0.0108 | 0.2 |
| totadminexp | 1 | -0.2807 | 0.1075 | 6.8111 | 0.0091 | 0.8 |
| detchexp | 1 | 0.0993 | 0.0491 | 4.0847 | 0.0433 | 2.7 |
| salary1000 | 1 | -0.0829 | 0.0381 | 4.7355 | 0.0295 | 0.44 |
| moves | 1 | 3.7987 | 0.4835 | 61.7221 | <.0001 | 44.6 |
| Middle | 1 | -0.1211 | 0.7854 | 0.0238 | 0.8774 | |
| HighSchool | 1 | -2.7447 | 1.5852 | 2.9980 | 0.0834 | |
| Kent | 1 | -2.7071 | 0.9568 | 8.0051 | 0.0047 | 0.1 |
| Sussex | 1 | -2.3201 | 1.2300 | 3.5578 | 0.0593 | |
| teacher_students | 1 | 0.0274 | 0.0425 | 0.4162 | 0.5188 | |
| students | 1 | 0.000338 | 0.00101 | 0.1126 | 0.7373 | |
| TSUSP | 1 | 0.0391 | 0.0192 | 4.1413 | 0.0418 | 1.0 |
| freelunch | 1 | -0.0162 | 2.1112 | 0.0001 | 0.9939 | |
| minority | 1 | -0.00057 | 0.0173 | 0.0011 | 0.9738 | |
| Tspec | 1 | 0.2283 | 0.0703 | 10.5541 | 0.0012 | 1.2 |
| math | 1 | -0.0155 | 0.0218 | 0.5044 | 0.4776 | |
| expenditures | 1 | -0.00013 | 0.000176 | 0.5714 | 0.4497 | |
| schools | 1 | 0.0253 | 0.0383 | 0.4378 | 0.5082 | |
| adminpercent | 1 | -0.3002 | 0.2235 | 1.8033 | 0.1793 | |
| timethere | 1 | 9.6541 | 4.9980 | 3.7310 | 0.0534 | |
| timethere | 2 | 10.2568 | 5.0989 | 4.0464 | 0.0443 | |
| timethere | 3 | 11.1359 | 5.1950 | 4.5950 | 0.0321 | |
| timethere | 4 | 11.3402 | 5.2206 | 4.7185 | 0.0298 | |
| timethere | 5 | 11.9911 | 5.1337 | 5.4558 | 0.0195 | |
| timethere | 6 | 12.8181 | 5.3449 | 5.7514 | 0.0165 | |
| timethere | 7 | 13.6749 | 5.3816 | 6.4570 | 0.0111 | |

Association of Predicted Probabilities and Observed Responses

| | | | |
|--------------------|-------|-----------|-------|
| Percent Concordant | 95.6 | Somers' D | 0.915 |
| Percent Discordant | 4.1 | Gamma | 0.918 |
| Percent Tied | 0.3 | Tau-a | 0.085 |
| Pairs | 29562 | c | 0.957 |

STAYED VS. LEFT FOR CENTRAL OFFICE (CENT OFF)

The LOGISTIC Procedure Model Information

| | |
|---------------------------|------------------|
| Data Set | WORK.STAYEDSAME4 |
| Response Variable | stayedsame |
| Number of Response Levels | 2 |
| Model | binary cloglog |
| Optimization Technique | Newton-Raphson |

| | |
|-----------------------------|------|
| Number of Observations Read | 1095 |
| Number of Observations Used | 807 |

| Response Profile | | |
|------------------|------------|-----------------|
| Ordered Value | stayedsame | Total Frequency |
| 1 | 0 | 49 |
| 2 | 1 | 758 |

Probability modeled is stayedsame=0.

NOTE: 288 observations were deleted due to missing values for the response or explanatory variables.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

| Criterion | Without Covariates | With Covariates |
|-----------|--------------------|-----------------|
| AIC | 1560.950 | 108.651 |
| SC | 1560.950 | 240.065 |
| -2 Log L | 1560.950 | 52.651 |

Testing Global Null Hypothesis: BETA=0

| Test | Chi-Square | DF | Pr > ChiSq |
|------------------|------------|----|------------|
| Likelihood Ratio | 1508.2987 | 28 | <.0001 |
| Score | 711.0802 | 28 | <.0001 |
| Wald | 24.7557 | 28 | 0.6411 |

Type 3 Analysis of Effects

| Effect | DF | Wald Chi-Square | Pr > ChiSq |
|--------------------|----------|-----------------|---------------|
| age | 1 | 2.2916 | 0.1301 |
| male | 1 | 0.6259 | 0.4289 |
| AfAm | 1 | 0.2464 | 0.6196 |
| totadminexp | 1 | 8.4722 | 0.0036 |
| detchexp | 1 | 5.9192 | 0.0150 |
| salary1000 | 1 | 5.0289 | 0.0249 |
| moves | 1 | 8.6686 | 0.0032 |
| Middle | 1 | 0.7395 | 0.3898 |
| HighSchool | 1 | 2.2481 | 0.1338 |
| Kent | 1 | 3.2057 | 0.0734 |

| | | | |
|---------------------|----------|---------------|---------------|
| Sussex | 1 | 2.7677 | 0.0962 |
| teacher_students | 1 | 1.7016 | 0.1921 |
| students | 1 | 5.3576 | 0.0206 |
| TSUSP | 1 | 1.8908 | 0.1691 |
| freelunch | 1 | 0.3825 | 0.5363 |
| minority | 1 | 0.7391 | 0.3900 |
| Tspec | 1 | 3.9436 | 0.0471 |
| math | 1 | 4.2018 | 0.0404 |
| expenditures | 1 | 5.6080 | 0.0179 |
| schools | 1 | 2.9400 | 0.0864 |
| adminpercent | 1 | 1.6627 | 0.1972 |
| timethere | 7 | 9.1109 | 0.2448 |

Analysis of Maximum Likelihood Estimates

| Parameter | DF | Estimate | Standard Error | Wald Chi-Square | Pr > ChiSq | Odds Ratios |
|---------------------|----------|-----------------|-----------------|-----------------|---------------|---------------|
| age | 1 | -0.0992 | 0.0655 | 2.2916 | 0.1301 | |
| male | 1 | 0.7040 | 0.8899 | 0.6259 | 0.4289 | |
| AfAm | 1 | 0.6313 | 1.2718 | 0.2464 | 0.6196 | |
| totadminexp | 1 | -2.1482 | 0.7380 | 8.4722 | 0.0036 | 0.1 |
| detchexp | 1 | 0.2630 | 0.1081 | 5.9192 | 0.0150 | 1.3 |
| salary1000 | 1 | -0.3804 | 0.1696 | 5.0289 | 0.0249 | 0.7 |
| moves | 1 | 13.6109 | 4.6229 | 8.6686 | 0.0032 | 814964 |
| Middle | 1 | 1.2325 | 1.4333 | 0.7395 | 0.3898 | |
| HighSchool | 1 | -4.2193 | 2.8141 | 2.2481 | 0.1338 | |
| Kent | 1 | -5.2986 | 2.9594 | 3.2057 | 0.0734 | |
| Sussex | 1 | -4.7233 | 2.8391 | 2.7677 | 0.0962 | |
| teacher_students | 1 | -0.4383 | 0.3360 | 1.7016 | 0.1921 | |
| students | 1 | 0.00923 | 0.00399 | 5.3576 | 0.0206 | 1.0 |
| TSUSP | 1 | -0.0968 | 0.0704 | 1.8908 | 0.1691 | |
| freelunch | 1 | 3.0026 | 4.8547 | 0.3825 | 0.5363 | |
| minority | 1 | -0.0335 | 0.0390 | 0.7391 | 0.3900 | |
| Tspec | 1 | 0.5177 | 0.2607 | 3.9436 | 0.0471 | 1.7 |
| math | 1 | -0.0991 | 0.0483 | 4.2018 | 0.0404 | 0.9 |
| expenditures | 1 | 0.000917 | 0.000387 | 5.6080 | 0.0179 | 1.0 |
| schools | 1 | 0.1346 | 0.0785 | 2.9400 | 0.0864 | |
| adminpercent | 1 | 0.5611 | 0.4351 | 1.6627 | 0.1972 | |
| timethere | 1 | 22.8642 | 14.2094 | 2.5892 | 0.1076 | |
| timethere | 2 | 24.6620 | 14.3915 | 2.9366 | 0.0866 | |
| timethere | 3 | 31.2421 | 16.1592 | 3.7380 | 0.0532 | |
| timethere | 4 | 32.6712 | 16.1813 | 4.0767 | 0.0435 | |
| timethere | 5 | 36.5114 | 17.4014 | 4.4024 | 0.0359 | |
| timethere | 6 | 37.2836 | 17.9201 | 4.3287 | 0.0375 | |
| timethere | 7 | 42.6764 | 19.4535 | 4.8126 | 0.0283 | |

Association of Predicted Probabilities and Observed Responses

| | | | |
|--------------------|-------|-----------|-------|
| Percent Concordant | 99.6 | Somers' D | 0.993 |
| Percent Discordant | 0.4 | Gamma | 0.993 |
| Percent Tied | 0.0 | Tau-a | 0.113 |
| Pairs | 37142 | c | 0.996 |

STAYED VS. LEFT THE DISTRICT (DIFF DIST)

The LOGISTIC Procedure

Model Information

| | |
|---------------------------|------------------|
| Data Set | WORK.STAYEDSAME5 |
| Response Variable | stayedsame |
| Number of Response Levels | 2 |
| Model | binary cloglog |
| Optimization Technique | Newton-Raphson |

| | |
|-----------------------------|------|
| Number of Observations Read | 1054 |
| Number of Observations Used | 774 |

Response Profile

| Ordered Value | stayedsame | Total Frequency |
|---------------|------------|-----------------|
| 1 | 0 | 16 |
| 2 | 1 | 758 |

Probability modeled is stayedsame=0.

NOTE: 280 observations were deleted due to missing values for the response or explanatory variables.

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

| Criterion | Without Covariates | With Covariates |
|-----------|--------------------|-----------------|
| AIC | 1530.678 | 139.329 |
| SC | 1530.678 | 255.618 |
| -2 Log L | 1530.678 | 89.329 |

Testing Global Null Hypothesis: BETA=0

| Test | Chi-Square | DF | Pr > ChiSq |
|------------------|------------|----|------------|
| Likelihood Ratio | 1441.3487 | 25 | <.0001 |
| Score | 735.5990 | 25 | <.0001 |
| Wald | 98.4832 | 25 | <.0001 |

Type 3 Analysis of Effects

| Effect | DF | Wald Chi-Square | Pr > ChiSq |
|--------------------|----------|-----------------|------------------|
| age | 1 | 0.2422 | 0.6226 |
| male | 1 | 0.3128 | 0.5760 |
| AfAm | 1 | 0.6396 | 0.4238 |
| totadminexp | 1 | 7.9953 | 0.0047 |
| detchexp | 1 | 0.1210 | 0.7279 |
| salary1000 | 1 | 13.3563 | 0.0003 |
| moves | 1 | 28.1987 | <.0001 |
| Middle | 1 | 0.0697 | 0.7918 |

| | | | |
|------------------|----------|----------------|---------------|
| HighSchool | 1 | 0.0442 | 0.8335 |
| Kent | 1 | 3.8323 | 0.0503 |
| Sussex | 1 | 3.0709 | 0.0797 |
| teacher_students | 1 | 1.0802 | 0.2986 |
| students | 1 | 5.4177 | 0.0199 |
| TSUSP | 1 | 1.2986 | 0.2545 |
| freelunch | 1 | 0.4709 | 0.4926 |
| minority | 1 | 1.6810 | 0.1948 |
| Tspec | 1 | 0.5269 | 0.4679 |
| math | 1 | 0.0240 | 0.8769 |
| expenditures | 1 | 0.0457 | 0.8306 |
| schools | 1 | 1.3857 | 0.2391 |
| adminpercent | 1 | 0.0019 | 0.9655 |
| timethere | 4 | 14.6296 | 0.0055 |

Analysis of Maximum Likelihood Estimates

| Parameter | DF | Estimate | Standard Error | Wald Chi-Square | Pr > ChiSq | Odds Ratios |
|--------------------|----------|----------------|----------------|-----------------|------------------|-------------|
| age | 1 | -0.0253 | 0.0514 | 0.2422 | 0.6226 | |
| male | 1 | 0.3946 | 0.7056 | 0.3128 | 0.5760 | |
| AfAm | 1 | -0.7649 | 0.9564 | 0.6396 | 0.4238 | |
| totadminexp | 1 | -0.4244 | 0.1501 | 7.9953 | 0.0047 | 0.7 |
| detchexp | 1 | 0.0191 | 0.0549 | 0.1210 | 0.7279 | |
| salary1000 | 1 | -0.1965 | 0.0538 | 13.3563 | 0.0003 | 0.8 |
| moves | 1 | 3.8202 | 0.7194 | 28.1987 | <.0001 | 45.6 |
| Middle | 1 | -0.2981 | 1.1290 | 0.0697 | 0.7918 | |
| HighSchool | 1 | -0.3400 | 1.6177 | 0.0442 | 0.8335 | |
| Kent | 1 | -2.1999 | 1.1238 | 3.8323 | 0.0503 | 0.1 |
| Sussex | 1 | -2.6386 | 1.5057 | 3.0709 | 0.0797 | |
| teacher_students | 1 | -0.2438 | 0.2346 | 1.0802 | 0.2986 | |
| students | 1 | 0.00318 | 0.00137 | 5.4177 | 0.0199 | 1.01 |
| TSUSP | 1 | 0.0428 | 0.0375 | 1.2986 | 0.2545 | |
| freelunch | 1 | 1.9729 | 2.8751 | 0.4709 | 0.4926 | |
| minority | 1 | -0.0301 | 0.0232 | 1.6810 | 0.1948 | |
| Tspec | 1 | 0.0811 | 0.1117 | 0.5269 | 0.4679 | |
| math | 1 | 0.00577 | 0.0372 | 0.0240 | 0.8769 | |
| expenditures | 1 | -0.00006 | 0.000261 | 0.0457 | 0.8306 | |
| schools | 1 | 0.0783 | 0.0665 | 1.3857 | 0.2391 | |
| adminpercent | 1 | -0.0155 | 0.3575 | 0.0019 | 0.9655 | |
| timethere | 1 | 17.2430 | 6.6194 | 6.7857 | 0.0092 | |
| timethere | 2 | 18.5799 | 6.7625 | 7.5486 | 0.0060 | |
| timethere | 3 | 20.7022 | 7.0886 | 8.5293 | 0.0035 | |
| timethere | 4 | 21.3988 | 7.1169 | 9.0406 | 0.0026 | |

Association of Predicted Probabilities and Observed Responses

| | | | |
|--------------------|-------|-----------|-------|
| Percent Concordant | 89.5 | Somers' D | 0.826 |
| Percent Discordant | 6.9 | Gamma | 0.856 |
| Percent Tied | 3.5 | Tau-a | 0.033 |
| Pairs | 12128 | c | 0.913 |

STAYED VS. LEFT (NON-RETIREE) (SYSR_DEP)

The LOGISTIC Procedure

Model Information

| | |
|---------------------------|------------------|
| Data Set | WORK.STAYEDSAME6 |
| Response Variable | stayedsame |
| Number of Response Levels | 2 |
| Model | binary cloglog |
| Optimization Technique | Newton-Raphson |

| | |
|-----------------------------|------|
| Number of Observations Read | 1088 |
| Number of Observations Used | 807 |

Response Profile

| Ordered Value | stayedsame | Total Frequency |
|---------------|------------|-----------------|
| 1 | 0 | 49 |
| 2 | 1 | 758 |

Probability modeled is stayedsame=0.

NOTE: 281 observations were deleted due to missing values for the response or explanatory variables.

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

| Criterion | Without Covariates | With Covariates |
|-----------|--------------------|-----------------|
| AIC | 1560.950 | 337.423 |
| SC | 1560.950 | 478.222 |
| -2 Log L | 1560.950 | 277.423 |

Testing Global Null Hypothesis: BETA=0

| Test | Chi-Square | DF | Pr > ChiSq |
|------------------|------------|----|------------|
| Likelihood Ratio | 1283.5275 | 30 | <.0001 |
| Score | 692.2783 | 30 | <.0001 |
| Wald | 240.4035 | 30 | <.0001 |

Type 3 Analysis of Effects

| Effect | DF | Chi-Square | Pr > ChiSq |
|--------------------|----------|----------------|------------------|
| age | 1 | 0.8615 | 0.3533 |
| male | 1 | 1.9806 | 0.1593 |
| AfAm | 1 | 4.0999 | 0.0429 |
| totadminexp | 1 | 39.2698 | <.0001 |
| detchexp | 1 | 1.9136 | 0.1666 |
| salary1000 | 1 | 0.0408 | 0.8399 |
| moves | 1 | 20.7670 | <.0001 |
| Middle | 1 | 0.0488 | 0.8252 |

| | | | |
|------------------|----------|----------------|---------------|
| HighSchool | 1 | 0.3682 | 0.5440 |
| Kent | 1 | 0.0565 | 0.8122 |
| Sussex | 1 | 0.2092 | 0.6474 |
| teacher_students | 1 | 0.4312 | 0.5114 |
| students | 1 | 1.5696 | 0.2103 |
| TSUSP | 1 | 0.0868 | 0.7682 |
| freelunch | 1 | 0.0515 | 0.8205 |
| minority | 1 | 0.7211 | 0.3958 |
| Tspec | 1 | 0.0048 | 0.9448 |
| math | 1 | 0.0568 | 0.8116 |
| expenditures | 1 | 1.4085 | 0.2353 |
| schools | 1 | 1.6911 | 0.1935 |
| adminpercent | 1 | 0.3075 | 0.5792 |
| timethere | 9 | 29.4425 | 0.0005 |

Analysis of Maximum Likelihood Estimates

| Parameter | DF | Estimate | Standard Error | Wald Chi-Square | Pr > ChiSq | Odds Ratios |
|--------------------|----------|----------------|----------------|-----------------|------------------|-------------|
| age | 1 | 0.0229 | 0.0246 | 0.8615 | 0.3533 | |
| male | 1 | -0.5363 | 0.3811 | 1.9806 | 0.1593 | |
| AfAm | 1 | -1.2620 | 0.6232 | 4.0999 | 0.0429 | 0.3 |
| totadminexp | 1 | -0.4665 | 0.0745 | 39.2698 | <.0001 | 0.6 |
| detchexp | 1 | -0.0364 | 0.0263 | 1.9136 | 0.1666 | |
| salary1000 | 1 | -0.00605 | 0.0299 | 0.0408 | 0.8399 | |
| moves | 1 | 1.6227 | 0.3561 | 20.7670 | <.0001 | 5.1 |
| Middle | 1 | -0.1477 | 0.6690 | 0.0488 | 0.8252 | |
| HighSchool | 1 | 0.4881 | 0.8044 | 0.3682 | 0.5440 | |
| Kent | 1 | 0.1631 | 0.6863 | 0.0565 | 0.8122 | |
| Sussex | 1 | 0.3582 | 0.7832 | 0.2092 | 0.6474 | |
| teacher_students | 1 | -0.0682 | 0.1039 | 0.4312 | 0.5114 | |
| students | 1 | 0.000772 | 0.000616 | 1.5696 | 0.2103 | |
| TSUSP | 1 | -0.00807 | 0.0274 | 0.0868 | 0.7682 | |
| freelunch | 1 | 0.3567 | 1.5720 | 0.0515 | 0.8205 | |
| minority | 1 | -0.00991 | 0.0117 | 0.7211 | 0.3958 | |
| Tspec | 1 | -0.00415 | 0.0599 | 0.0048 | 0.9448 | |
| math | 1 | -0.00410 | 0.0172 | 0.0568 | 0.8116 | |
| expenditures | 1 | -0.00014 | 0.000121 | 1.4085 | 0.2353 | |
| schools | 1 | 0.0414 | 0.0319 | 1.6911 | 0.1935 | |
| adminpercent | 1 | -0.0896 | 0.1617 | 0.3075 | 0.5792 | |
| timethere | 1 | 1.7984 | 3.9414 | 0.2082 | 0.6482 | |
| timethere | 2 | 2.1536 | 3.9756 | 0.2935 | 0.5880 | |
| timethere | 3 | 2.9925 | 4.0482 | 0.5465 | 0.4598 | |
| timethere | 4 | 3.6895 | 4.0263 | 0.8397 | 0.3595 | |
| timethere | 5 | 3.1175 | 4.0628 | 0.5888 | 0.4429 | |
| timethere | 6 | 3.8924 | 4.1911 | 0.8625 | 0.3530 | |
| timethere | 7 | 4.7382 | 4.2487 | 1.2437 | 0.2648 | |
| timethere | 8 | 5.6980 | 4.2858 | 1.7676 | 0.1837 | |
| timethere | 9 | 5.9426 | 4.3111 | 1.9001 | 0.1681 | |

Association of Predicted Probabilities and Observed Responses

| | | | |
|--------------------|-------|-----------|-------|
| Percent Concordant | 85.5 | Somers' D | 0.716 |
| Percent Discordant | 13.9 | Gamma | 0.720 |
| Percent Tied | 0.6 | Tau-a | 0.082 |
| Pairs | 37142 | c | 0.858 |

STAYED VS. LEFT (RETIRED) (RETIRED)¹⁹

The LOGISTIC Procedure

Model Information

| | |
|---------------------------|------------------|
| Data Set | WORK.STAYEDSAME8 |
| Response Variable | stayedsame |
| Number of Response Levels | 2 |
| Model | binary cloglog |
| Optimization Technique | Newton-Raphson |

| | |
|-----------------------------|------|
| Number of Observations Read | 1057 |
| Number of Observations Used | 781 |

Response Profile

| Ordered Value | stayedsame | Total Frequency |
|---------------|------------|-----------------|
| 1 | 0 | 23 |
| 2 | 1 | 758 |

Probability modeled is stayedsame=0.

NOTE: 276 observations were deleted due to missing values for the response or explanatory variables.

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

| Criterion | Without Covariates | With Covariates |
|-----------|--------------------|-----------------|
| AIC | 1537.099 | 141.418 |
| SC | 1537.099 | 262.593 |
| -2 Log L | 1537.099 | 89.418 |

Testing Global Null Hypothesis: BETA=0

| Test | Chi-Square | DF | Pr > ChiSq |
|------------------|------------|----|------------|
| Likelihood Ratio | 1447.6809 | 26 | <.0001 |
| Score | 726.6460 | 26 | <.0001 |
| Wald | 61.8249 | 26 | <.0001 |

Type 3 Analysis of Effects

| Effect | DF | Chi-Square | Pr > ChiSq |
|--------------------|----------|----------------|------------------|
| <i>age</i> | <i>1</i> | <i>19.9259</i> | <i><.0001</i> |
| <i>male</i> | <i>1</i> | <i>11.7670</i> | <i>0.0006</i> |
| <i>AfAm</i> | <i>1</i> | <i>3.7800</i> | <i>0.0519</i> |
| <i>totadminexp</i> | <i>1</i> | <i>14.1360</i> | <i>0.0002</i> |
| detchexp | 1 | 0.5607 | 0.4540 |
| salary1000 | 1 | 0.7416 | 0.3891 |

¹⁹ Note: The dummy variable High School was dropped from this equation due to too few observations.

| | | | |
|--------------------------------|-----------------|-----------------------|----------------------|
| <i>moves</i> | <i>1</i> | <i>12.8812</i> | <i>0.0003</i> |
| Middle | 1 | 1.9836 | 0.1590 |
| <i>Kent</i> | <i>1</i> | <i>13.8071</i> | <i>0.0002</i> |
| <i>Sussex</i> | <i>1</i> | <i>9.0513</i> | <i>0.0026</i> |
| <i>teacher_students</i> | <i>1</i> | <i>5.4302</i> | <i>0.0198</i> |
| students | 1 | 1.0444 | 0.3068 |
| <i>TSUSP</i> | <i>1</i> | <i>6.1938</i> | <i>0.0128</i> |
| freelunch | 1 | 1.7613 | 0.1845 |
| minority | 1 | 0.4410 | 0.5066 |
| Tspec | 1 | 0.9440 | 0.3313 |
| math | 1 | 1.0249 | 0.3114 |
| <i>expenditures</i> | <i>1</i> | <i>4.7163</i> | <i>0.0299</i> |
| <i>schools</i> | <i>1</i> | <i>9.0840</i> | <i>0.0026</i> |
| adminpercent | 1 | 1.3350 | 0.2479 |
| <i>timethere</i> | <i>6</i> | <i>14.8150</i> | <i>0.0217</i> |

Analysis of Maximum Likelihood Estimates

| Parameter | DF | Estimate | Standard Error | Wald Chi-Square | Pr > ChiSq | Odds Ratios |
|--------------------------------|-----------------|------------------------|------------------------|-----------------------|-------------------------|---------------------|
| <i>age</i> | <i>1</i> | <i>0.4994</i> | <i>0.1119</i> | <i>19.9259</i> | <i><.0001</i> | <i>1.6</i> |
| <i>male</i> | <i>1</i> | <i>3.0043</i> | <i>0.8758</i> | <i>11.7670</i> | <i>0.0006</i> | <i>20.2</i> |
| <i>AfAm</i> | <i>1</i> | <i>1.7491</i> | <i>0.8996</i> | <i>3.7800</i> | <i>0.0519</i> | <i>5.7</i> |
| <i>totadminexp</i> | <i>1</i> | <i>-0.5187</i> | <i>0.1380</i> | <i>14.1360</i> | <i>0.0002</i> | <i>0.6</i> |
| detchexp | 1 | 0.0284 | 0.0380 | 0.5607 | 0.4540 | |
| salary1000 | 1 | -0.0469 | 0.0545 | 0.7416 | 0.3891 | |
| <i>moves</i> | <i>1</i> | <i>2.4573</i> | <i>0.6847</i> | <i>12.8812</i> | <i>0.0003</i> | <i>11.7</i> |
| Middle | 1 | -1.8558 | 1.3176 | 1.9836 | 0.1590 | |
| <i>Kent</i> | <i>1</i> | <i>-5.6970</i> | <i>1.5332</i> | <i>13.8071</i> | <i>0.0002</i> | <i>0.003</i> |
| <i>Sussex</i> | <i>1</i> | <i>-5.0719</i> | <i>1.6858</i> | <i>9.0513</i> | <i>0.0026</i> | <i>0.01</i> |
| <i>teacher_students</i> | <i>1</i> | <i>-0.5843</i> | <i>0.2507</i> | <i>5.4302</i> | <i>0.0198</i> | <i>0.6</i> |
| students | 1 | 0.00134 | 0.00131 | 1.0444 | 0.3068 | |
| <i>TSUSP</i> | <i>1</i> | <i>-0.1846</i> | <i>0.0742</i> | <i>6.1938</i> | <i>0.0128</i> | <i>0.8</i> |
| freelunch | 1 | 4.6538 | 3.5066 | 1.7613 | 0.1845 | |
| minority | 1 | 0.0196 | 0.0295 | 0.4410 | 0.5066 | |
| Tspec | 1 | 0.0959 | 0.0987 | 0.9440 | 0.3313 | |
| math | 1 | 0.0293 | 0.0290 | 1.0249 | 0.3114 | |
| <i>expenditures</i> | <i>1</i> | <i>-0.00050</i> | <i>0.000229</i> | <i>4.7163</i> | <i>0.0299</i> | <i>.9995</i> |
| <i>schools</i> | <i>1</i> | <i>-0.2308</i> | <i>0.0766</i> | <i>9.0840</i> | <i>0.0026</i> | <i>0.8</i> |
| adminpercent | 1 | -0.5032 | 0.4355 | 1.3350 | 0.2479 | |
| timethere | 1 | -8.9764 | 9.5885 | 0.8764 | 0.3492 | |
| timethere | 2 | -9.4334 | 9.3422 | 1.0196 | 0.3126 | |
| timethere | 3 | -7.3040 | 9.5957 | 0.5794 | 0.4465 | |
| timethere | 4 | -6.7552 | 9.5057 | 0.5050 | 0.4773 | |
| timethere | 5 | -5.2555 | 9.5011 | 0.3060 | 0.5802 | |
| timethere | 6 | -6.9912 | 9.5692 | 0.5338 | 0.4650 | |

Association of Predicted Probabilities and Observed Responses

| | | | |
|--------------------|-------|-----------|-------|
| Percent Concordant | 97.2 | Somers' D | 0.944 |
| Percent Discordant | 2.8 | Gamma | 0.945 |
| Percent Tied | 0.1 | Tau-a | 0.054 |
| Pairs | 17434 | c | 0.972 |