Principals as Teachers:
Measures of quality & distribution in the school leadership labor supply

By

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To my closest family,

Micah, Eliana, Nathan

and

my beloved wife, Tiz

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CHAPTER I

INTRODUCTION

Throughout the 20th century some critics questioned whether school leadership had produced a substantive impact on student outcomes (Meindl, 1998). Compelling empirical evidence that leadership impacts student outcomes is in short supply, yet over the last several decades public and professional sentiment supporting school leadership has remained strong. Methodological shortcomings notwithstanding, findings that high quality school leadership has significant, positive influence have been recurrent across a variety of leadership definitions, schooling contexts, analytical models, and outcome measures (Leithwood, Harris, & Hopkins, 2008; Louis, Leithwood, Wahlstrom, Anderson, Michlin, Mascall, Gordon, Strauss, Thomas, & Moore, 2010; Robinson, Lloyd, & Rowe, 2008; Supovitz, Sirinides, & May, 2010).

Research investigating leadership has accelerated in recent years, in part owing to the consensus that school leadership is critically linked to student outcomes, but also to a surge in the data available to conduct such research. Much of this research focuses on questions of leadership (a) preparation, (b) development, (c) leadership effectiveness, and, (d) labor market issues. By a substantial margin the strands of school leadership dominating the research landscape have pertained to leadership preparation and measures of effectiveness. This focus on preparation and measures can be contrasted with conventional approaches in other domains of leadership studies, which tend to place a premium on labor market perspectives such as selection, distribution, and compensation. Nonetheless, school leadership research surrounding the compensation (Cullen & Mazzeo, 2010), distribution (Loeb, Kalogrides, & Horng, 2010), mobility (Battle & Gruber, 2010), recruitment (Stark-Price, Muñoz, Winter, & Petrosko, 2006), promotion (Gates, Ringel, & Santibanez, 2003), certification (Papa Jr, Lankford, & Wyckoff, 2002), and attrition (Miller, 2010) of administrators (i.e. principals, vice-principals, or assistant principals) has proliferated in recent years.

Although growing, this research base on educational leadership labor markets is small, our understanding of labor dynamics is limited, and much of our knowledge is concentrated on the post-hire leadership labor market. As it stands we know little about school leaders before they took up their leadership position and less still about how they compare other teachers who chose not to enter school leadership.

While the influential role of leadership on student outcomes may constitute adequate motivation to better understand the nuances of the leadership labor supply, a shrinking pool of qualified administrative applicants provides an additional layer of importance and urgency to this line of research. The number of certified individuals remains quite high and yet district officials have expressed that too few individuals apply for positions that are becoming increasingly vacated and the quality of these applicants is a subject of concern (Neudecker, 2007; Pijanowski, Hewitt, & Brady, 2009; Roza, Celio, Harvey, & Wishon, 2003; Education Research Service, 2000; Whitaker, 2003; Winter & Morgenthal, 2002). In addition to concerns of labor supply, asymmetric distributions of human resources in schools may be exacerbating an already large academic achievement gap (Haycock & Jerald, 2001; Murphy, 2010; Rothstein, 2004). Given the connections between school leadership and student learning, a thorough understanding of how new school leaders are sorted and distributed is a key question in the education labor market.

An additional consideration motivating an inquiry into educational leadership labor supply stems from work conducted on the labor supply of school teachers. Understanding the seminal role of teachers on student learning, many researchers have sought to contrast the characteristics, qualifications, and aptitudes of individuals who move into teaching as compared to their peers who pursue other career paths (e.g., Wise, Darling-Hammond, Berry, Berliner et al., 1987). Building off this research later work linked these pre-teaching characteristics, qualifications, and aptitudes to measures of teaching quality (e.g. Ballou, 1996; D'Agostino & Powers, 2009) and distribution (e.g.

Clotfelter, Ladd, & Vigdor, 2005). Lastly, highly effective teachers are a prized resource within the education system. Knowing whether these teachers disproportionately exit the classroom to pursue leadership positions is a key concern when considering questions of human resource management within and among districts.

A first step in examining the supply and distribution of school leaders is to link the research on effective leadership with the characteristics and experiences of individuals who are most likely to become leaders: school teachers. The research on school leadership suggests that there are specific skills, knowledge, and behaviors that differentiate highly effective from ineffective principals. Many of these behaviors center around instructional matters. Given the positive emphasis school leaders place on their prior experiences as teachers (Fiore & Curtin, 1997), we may expect the quality of these experiences to play a role in the shaping subsequent leadership behaviors.

Examining the literature on effective teaching, effective schools, and effective leadership, two aspects of the pre-leadership experience appear to have the most promise of predicting subsequent leadership effectiveness: those experiences in the classroom and those within the school. In the classroom, teachers develop their pedagogical knowledge, refine their communication skills, deepen their understanding of the psycho-social dynamic of teaching and learning, while delivering content, providing feedback, and interpreting results. Although not exhaustive of all that is learned throughout the teaching experience, the preceding list captures several of the skills gained in the classroom that add to a teacher's instructional capacity. Of the many conceptualizations of leadership, learning-centered leadership has shown the strongest ties to student outcomes (Robinson et al., 2008). This mode of school leadership is defined by the behaviors principals undertake as they support teaching and learning (Hallinger, 2010b). It is a reasonable conjecture that the above competencies acquired as a classroom teacher may later inform a principal's capacity to understand, implement, and support learning-centered leadership practices.

The second aspect of pre-leadership experience that may inform subsequent leadership practices concerns the school-wide environment in which the teaching took place. Recent work has articulated the principal's role in shaping and maintaining the organizational context of the school. Aspects of the organizational context within the principal's realm of influence include cultivating professional community, promoting normative behaviors for students and staff that promote learning, developing links with parents and community, maintaining facilities, and ensuring a safe school environment (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010; Grissom & Loeb, 2009). Here we may expect that teachers with experience in highly effective schools may be more likely to reproduce and support such organizational qualities in their role as school leaders.

Motivated by a need to better understand the school leadership pipeline coupled with the potential importance of leaders' prior experiences in highly effective schools or as a highly effective instructor, I ask the following research questions:

1. To what extent is school quality related to a teacher's movement into a leadership position?
2. To what extent is instructional quality related to a teacher's movement into a leadership position?
3. Do highly effective teachers, or teachers from highly effective schools, tend to move to leadership positions in high status schools, or do these teachers move to schools most in need?

For the purpose of this research I define school leadership to be principals or assistant principals. This research is organized into 8 sections. In section 2, I outline a framework describing why measures of individual instructional effectiveness as well as prior experience in effective schools may be promising measures with which to predict subsequent application and placement in leadership positions. Section 3 provides an overview of the existing knowledge of labor dynamics within school administration, highlighting the measures and methods of interest to this line of research. The variables central to this inquiry are operationalized in section 4. A summary of the data are

outlined in section 5. Section 6 identifies the value-added modeling approach, including prior use in research and limitations; section 6 also outlines the analytical models used to address each of the research questions. Section 7 presents the descriptive and analytical results. A discussion of the results is outlined in section 8 and the paper concludes with the implications for future work.

CHAPTER II

RESEARCH FRAMEWORK

II.1 The Big Picture: Leadership Selection

This line of research is a subsection of the broader picture regarding leadership selection in education. In the business world identifying the right candidate for the position is well established as a, if not the, critical leadership decision (e.g., Smart & Street, 2008). In contrast, the education world has focused extensively on post-selection elements such as leadership preparation, leadership standards, and leadership development. Perhaps this focus is a result of the union mentality of teaching, where differentiation among teachers is discouraged and a teacher's seniority and education tend to be their defining characteristics. With such a perspective, all teachers with comparable education and experience would be equally able as a school leader. Selection would then be cursory and based on credentials while the primary investment in leadership capacity would be directed towards a training and support program. Indeed, the only state mandates for matriculation into school leadership are those that identify a minimum number of years of experience as a teacher and those that require school leaders to hold a masters degree (Zimmerman, 2002). Regardless of the underlying rationale, there is no empirical research to justify either seniority or education gateway policies.

The nation's largest professional organizations specializing in school leadership, such as the American Association of School Administrators, the National Association of Elementary School Principals, the National Association of Secondary School Principals, the University Council for Educational Administration, and the National Council of Professors of Educational Administration, have endorsed the Interstate School Leaders Licensure Consortium (ISLLC) standards, yet provide no guidance to identify the critical characteristics or experiences of teachers that districts may use to guide their recruitment policies. This is not to imply that selection is perceived as unimportant. The American Association of School Administrators has noted that leadership preparation

programs that continue to focus on admission rather than selection procedures will have a deleterious effect on the quality of school leaders and the field as a whole. It is not uncommon for literature on leadership preparation to speak to the centrality of selection and to lament the current ad-hoc nature of many selection processes (e.g., Browne-Ferrigno & Muth, 2009; Murphy, 1992). However there is very little systematic knowledge regarding the prevalence of various selection criteria for leadership preparation programs and still less highlighting how schools choose among various leadership applicants, especially when schools are considering inexperienced leadership candidates.

In a study of 200 superintendents Rammer (2007) reported that 56.2% of respondents indicated that they did not have "any systematic, intentional, or purposeful means (p. 74) of determining whether applicants possessed any of the ideal attributes when hiring principals. Critics have maligned leadership selection within education as being "anecdotal" and "atheoretical" (Hooker, 2000). The need for theoretically and empirically grounded selection criteria is not a new phenomenon. Citing Culbertson & Farquhar (1970), Murphy (1992, p. 80) notes that "over the last 50 years, 'the predominant [recruitment] methodologies still consist of chance encounters with potential candidates, randomly distributed bulk-mail brochures, and self-recruitment by prospective students."' Given these repeated messages of poor selection mechanisms over the last several decades coupled with an urgency to produce highly effective school leaders, we should expect a more nuanced and thoughtful set of criteria by which schools can use to select new leaders.

II.2 Principal Effectiveness

Many states have mandated a minimum number of years of teaching experience before one is eligible to move into a leadership position. These requirements, ranging from 0-5 years, have no apparent empirical foundation linking the years of teaching experience to subsequent leadership effectiveness. Some evidence suggests that principal's years of experience as a teacher is often unrelated to leadership outcome measures (e.g. Goff, Goldring, & Bickman, 2012; Shen, Leslie,

Spybrook, & Ma, 2012); such findings may be a result of subsequent leadership experience dominating any variance explained by prior teaching experience. It may be the case that the duration of teaching experience may have a greater impact on leadership for new leaders. More likely however, the relevant question is not how long a principal taught, but rather, *how well* they taught.

The logic supporting this research is simple: the quality of a school leader's experience as a teacher may influence their effectiveness as a school leader. Presumably, not all prior teaching experiences are equal in this regard – some are undoubtedly more influential and others are less so. To illustrate the ways in which the teaching experience may influence subsequent leadership, I first examine the literature on effective leadership. This body of research presents a compelling foundation for two main channels by which principals can impact student outcomes: learning-centered leadership and organizational effectiveness. Assuming that principals exert the majority of their influence through these two channels, I argue that the two most likely determinants of leadership quality may be found in a teacher's instructional ability and the overall quality of the school in which they taught.

II.3 Learning-Centered Leadership

Conceptually compelling arguments have been crafted for a multitude of leadership behaviors (e.g. transformational, distributed, situational, etc.). Of the various conceptions of leadership, learning-centered leadership has encountered repeated popular and empirical support. This model of leadership, which shares much common ground with instructional leadership and instructional management, is characterized by principals who focus on cultivating teachers' opportunities to improve their instruction and student learning (Goldring, Porter, Murphy, Elliott, & Cravens, 2009). Learning-centered leadership is characterized by "strong, directive leadership focused on curriculum and instruction from the principal" (Hallinger, 2003, p.329).

Evidence in favor of learning-centered leadership spans several decades (Hallinger, 2010b).

A meta-analysis by Robinson, Lloyd, & Rowe (2008) evaluates 22 of 27 studies that link leadership to student outcomes. The authors conclude that instructionally focused leadership has a substantially greater impact on student outcomes – over three fold – than does transformational leadership. Other studies have also found that leadership focused intently upon supporting teaching and learning leads to improved student outcomes (Blase, 2004; Hallinger, 2005; Halverson, Prichett, & Watson, 2007).

Hallinger & Murphy (1985) articulate eleven job functions that are characteristic of school leaders who work to support teaching and learning. Of particular relevance here are: supervising and evaluating instruction; coordinating curriculum; monitoring student progress; protecting instructional time; providing incentives for teachers; and providing incentives for students. In their taxonomy of behaviors for learning-centered leadership Goldring et al. (2009) identify six core components of learning-centered leadership: high standards for student learning; rigorous curricula; quality instruction; culture of learning and professional behavior; connections to external communities; and systemic performance accountability. These attributes of learning-centered leadership closely mirror several key characteristics of effective teaching.

Research on the characteristics of effective teaching by Charlotte Danielson has found that the ways teachers engage planning and preparation, the classroom environment, instruction, and professional responsibilities are among the key elements of effective instruction (Danielson, 2007). These characteristics are reiterated in much of the research on effective teaching, including work by Marzano (2009; 2007), Howes and Pianta, (2011), and Stronge (2007). According to Danielson, planning and preparation identifies how a teacher designs instruction and consists of: knowledge of content and pedagogy, knowledge of the students, selection of instructional goals, knowledge of resources, design of coherent instruction, and assessment of student learning. Characteristics of the classroom environment captures non-instructional elements of effective teachers, such as the respect and rapport among the students and with the teacher, a culture for learning, the management

of classroom procedures and student behavior, and the organization of the physical space. The instruction component entails clear and accurate communication, the use of questioning and discussion techniques, engaging students in learning, providing feedback to students, and demonstrating flexibility and responsiveness. Reflection on teaching, maintaining accurate records, communicating with families, contributing to the school and district, growing and developing professionally, and showing professionalism comprise the final domain of professional responsibilities (Danielson, 2007).

I contend that the exemplary learning-centered leadership behaviors explicated previously are strengthened by a principal's experience in the classroom and, further, that teachers who have repeatedly demonstrated superior instructional quality may be better able to execute these leadership functions effectively. Often, these connections between high-quality teaching and high-quality learning-centered leadership are intuitive and straight-forward. For example, Murphy et al. (2007) stress principals' knowledge of and involvement with the curricular program. Danielson (2007) stresses teachers' knowledge of content and pedagogy as well as the design of coherent instruction. This leads one to believe that teachers who know the content, know how to teach the content, and know how to meaningfully order and structure the content delivery may use those same skills as a school leader to facilitate discussions and critiques of meaningful and developmentally appropriate curriculum within their school.

The supervision and evaluation of instruction is a task that often takes place in the classroom, in real time (Acheson & Gall, 1987). Even when supplied with rubrics and training, those principals who themselves were exceptional teachers may be better able to interpret the student-teacher dynamic and provide the teachers with meaningful feedback. Their ability to meaningfully identify the essential areas for instructional improvement may also help teachers be more receptive to critical feedback. Effective coordination of curricula and monitoring of student progress both rely on an understanding of teaching and learning. While a technical understanding of learning theory

is needed when undertaking these tasks, meaningful experiences grappling with the challenges of pacing or engaging students of differing learning styles may provide a richer appreciation for the subtle details of coordinating curricula or monitoring student progress. A similar logic follows the development and implementation of incentives for teachers and students. Teachers who demonstrated superior instructional skills may be better equipped to design incentives for both teachers (since they were likely familiar with incentives that facilitate exceptional instruction, as in Ames & Ames (1984)) and students (since exceptional teachers likely used multiple approaches to motivate student learning, as in Frome, Lasater, Cooney, & Board (2005)).

Lastly, some have argued that school leaders' impact on students operates by improving the instructional capacity of teachers in their school (Hallinger, 2010a; Leithwood & Mascall, 2008). In short, good school leaders help their faculty become better teachers. While there are notable differences between facilitating the development of adolescents and facilitating the professional growth of adults, there is substantial overlap in these domains as well. Teachers promote growth in their students through a combination of trust, communication, monitoring, and feedback. These are the among same skills that Blase and Kirby (2008) have identified effective principals using to nurture the instructional capabilities of their staff.

The first and second research questions of this study aim to identify experiences or characteristics of teachers that may predict their matriculation into school leadership. To be meaningful for policy, these factors should have also relate to subsequent leadership ability. Therefore, the first research question seeks to use instructional quality as a predictor of a teacher's propensity to enter school leadership.

II.4 Organizational Effectiveness

While evidence for learning-centered leadership has been growing steadily for decades, empirical support for leadership directed towards the organizational aspects of schools has been compara-

tively recent. Nevertheless, the evidence in favor of leadership behaviors directed towards organizational aspects of schooling have been shown to have a positive impact on student outcomes. These organizational factors include cultivating professional community, promoting normative behaviors for students and staff that promote learning, developing links with parents and community, maintaining facilities, and ensuring a safe school environment (Bryk et al., 2010; Grissom & Loeb, 2009).

Grissom & Loeb (2009) use multi-source data from 283 schools in Miami-Dade County Florida to explore aspects of principal behaviors. Principals, vice-principals, and parents were surveyed and schools were later linked to value-added measures. The authors find that principals leading schools that demonstrate exceptional organization management (e.g. managing facilities, budgets, and resources; developing a safe school environment) have a significant relationship to improving student achievement (Grissom & Loeb, 2009). The research is exploratory and the results are strictly correlational, yet the findings suggest that the school context as a whole plays a role in promoting student achievement. A separate analysis from this data report portray a similar relationship between leadership and organizational supports (Horng, Klasik, & Loeb, 2010).

In an exhaustive review of the literature on effective leadership Louis, Leithwood, Wahlstrom, Anderson, Michlin, Mascall, Gordon, Strauss, Thomas, & Moore (2010) note that the organizational importance of school leadership is well documented throughout the leadership literature, citing examples from Hallinger and Heck (1999) who emphasize "structures and social systems," Conger and Kanungo who stress "context changing strategies" and Robinson et al. (2008) who continually underscore the importance of leadership in shaping organizational supports. The authors classify these organizational elements as the building collaborative cultures, restructuring the organization to support collaboration, building productive relationships with families and communities, and connecting the school to the wider community. Each of these elements impacts achievement within the classroom by strengthening connections between classrooms as well as

between classrooms and the school community.

A longitudinal study of Chicago Public Schools Bryk et al. (2010) identifies 100 schools that substantially improved student outcomes and 100 schools that declined or stagnated over that same period. The authors identify five organizational supports associated with improving student achievement: parent involvement, work orientation, safety and order, curriculum alignment, and school leadership (Bryk et al., 2010). Upon identifying these organizational supports as characteristic of rising student achievement, the authors then provide evidence that these supports are not free functioning, independent aspects of successful schools; rather each of the five supports is crucial and leadership drives change in the other domains Bryk et al. (2010).

The implications of the research on organizational effectiveness suggests that schools that significantly improve student outcomes do so through school-wide changes that impact the daily behaviors and professional culture of teachers in the school, and the catalyst for this change begins with the principal. Further, teachers in schools that improve student outcomes are not only exposed to the organizational mechanisms of school-wide change, they – as a collective faculty – are active participants in the change process. A second implication of these findings is that teachers in these schools have the opportunity to observe and experience, at least in part, how school leadership successfully engages and maintains organizational change.

The evidence above provides conceptual links between the research on teacher and school quality to research on effective leadership behaviors. These links suggest the importance of using teacher and school-level measures of quality within leadership supply analyses. The consideration of additional factors, such as wage differentials or gender, are required in order to identify unbiased estimates of these quality measures on the matriculation into leadership, as well as subsequent distribution. The next section provides a survey of the existing literature on principal labor markets, identifying the central factors and methodological considerations pertinent to the proposed research

questions.

CHAPTER III

SCHOOL LEADERSHIP LABOR MARKETS

The questions guiding this research seek to make comparisons between those teachers move into school leadership and and those who do not. Much of the research on principal labor markets makes comparisons between existing administrators, comparing factors such as gender, pay, and retention. Few studies, however, are able to stretch back in time to compare teachers who went on to become school leaders with those who stayed in the classroom. Literature on leadership mobility, for example, may be enriched by knowing whether teacher mobility is related to leadership mobility. Likewise, this research links teachers to student outcomes over time and then follows teachers as they move into leadership positions. The literature reviewed here is based predominantly on comparisons between school leaders; the factors identified within this body of research are used to guide this study as I step back to examine comparisons among teachers (e.g., which teachers move into leadership positions).

This research compares teachers through three related questions; the first and second will identify relationships between school and teacher quality measures (respectively) with a teacher's likelihood to move from teaching to school leadership. The level of analysis for these first two questions is the individual teacher and comparisons are made among teachers. The third question will identify relationships between teacher and school quality measures with the quality of the school at which the individual becomes a school leader. The level of analysis for the third question is the vacancy and comparisons are made among all newly hired school leaders filling those vacancies. Prior research on educational labor markets has identified a number of factors that influence employment decisions. Factors likely related to movement into administration are gender, compensation as a teacher, compensation as an administrator, and experience; these factors as well as prior administrative departures and geographic region are relevant to the distribution of new

administrators.

III.1 Gender

In the vast majority of cases – 99%, as of the 2007-08 Schools and Staffing Survey – principals began their career in education as classroom teachers (Fiore & Curtin, 1997). In one of the few studies of principal labor markets that directly addresses teachers as the labor supply, Joy (1998) notes the gender asymmetry between teachers and school leaders, pursuing the question of potential gender bias within administrative hiring. Female teachers comprise 86% and 51% of elementary and high schools, respectively (Joy, 1998). However, when one examines female representation of principals, these proportions drop to 22% and 25%, respectively. After estimating equations from both the supply and demand perspectives, bivariate probit results suggest that substantial gender bias may be at play within promotions into school leadership (Joy, 1998). In estimating the first stage of the model, which uses labor supply characteristics to predict which teachers are likely to earn an administrative masters degree, the author finds the gap between teacher and administrator salaries to be the largest significant variable (by an order of magnitude), followed by the individual's share of the family income (Joy, 1998). Although Joy's sample is cross-sectional, small (99 individuals moving into administration), and likely biased (as "administrator" includes subject department heads as well as principals and vice-principals), this study provides a rare and informative glimpse into the movement from the classroom to the school office. Given the significance of this finding, gender will be included as a covariate in the analyses for the first two research questions pertaining to movement into leadership.

III.2 Compensation

Typically, accepting a full-time leadership position requires assuming the additional responsibilities of leadership and is accompanied by an increase in base salary. Lortie notes that the increasing burdens of school leadership coupled with more oversight and less perceived job security (owing to school closings and accountability plans) have outpaced the financial compensation in leadership

positions (Lortie, 2009). The teacher-principal salary difference may range from 10% to 30% of the annual teacher salary (Brewer, 1996), with several factors impacting the teacher-administrator pay gap. Since the administrative contract length is typically longer than that of classroom teachers, differences in annual pay shrink when comparing monthly salaries. Elementary school principals tend to earn less than their high school counterparts (Battle, 2009). Lastly, this salary gap may be influenced by district pay schedules and the years of experience when one makes the transition to leadership. Urban districts typically have higher initial teacher salaries, however urban salary schedules tend to plateau sooner and are frequently surpassed by their suburban neighbors with increasing experience (Baugh & Stone, 1982; Player, 2009). Principal pay has typically been lower in urban schools, although administrative salary in some urban districts have become quite competitive in recent years (Papa Jr et al., 2002). In practice, an urban teacher early in their career considering an urban administrative position would face smaller financial incentives than a similar suburban teacher considering suburban administrative positions. This incentive difference, however, would narrow and possibly reverse as the teachers gained experience and moved up the career ladder. Brewer (1996) explores the motivating impact of this pay differential using a ten year panel of new teacher hires from New York. He finds evidence that the magnitude of the teacher-administrator salary difference does indeed motivate some teachers to transition into leadership positions. He notes, however, that this effect is small and, contrary to Joy (1998), nearly exclusive to males (Brewer, 1996).

Looking further at principal salaries, Billger (2007) regresses the usual suspects of salary correlates (education, experience, gender, ethnicity, age, urban location indicators, per-pupil expenditures, and students' parental education) on principal earnings and interprets the residual to be an indicator of principal quality. Billger's key assumption that the labor market for educational leadership is sufficiently efficient to identify and financially reward the best principals is far from certain. The predicted quality indicator is then used to evaluate principal responsiveness to accountability policies. Reporting results for both two-stage least squares estimation and quantile regression,

Billger finds mixed results. With findings of direct import to the line of research presented here, Billger interprets a negative correlation between accountability and the best principals (most positive salary residual) to possibly indicate that more able principals are selecting or being assigned to schools most in need of strong leadership. Ultimately, Billger concludes that, "[p]erhaps, like many teachers, the best principals were not motivated by money, but by their ability to positively affect students" (Billger, 2007, p. 106).

While the cross-sectional analysis from Billger yielded mixed results regarding relationships between principal pay and outcomes, a forthcoming study by Cullen & Mazzeo (2010) uses seventeen years of longitudinal data in Texas and concludes that principals are not financially rewarded for impacting student achievement until they accept a position at another institution. Here the authors observe that principals who exceeded expectations at their last school (i.e. had positive value-added scores) receive significantly higher salaries at their next job as compared with others who fell short of expected student growth. To the extent that this finding generalizes beyond Texas, the Cullen and Mazzeo study suggests that schools hire leaders based at least in part, on demonstrable prior effectiveness. If prior effectiveness is a consideration for hiring established school leaders then we may think that some other measure of prior effectiveness (perhaps as a teacher) may be a consideration when hiring new leaders.

III.3 Experience

One of the more robust findings regarding teachers moving into administration pertains to the role of experience. Many states require that teachers spend three to five years in the classroom before moving into administration. While some teachers meet this minimum threshold and then move on, the more common trend to is spend a decade or more as a teacher prior to moving exclusively into a leadership role (Fiore & Curtin, 1997).

In a study examining principals in New York City, Papa et al. (2002) find that teachers are

moving into leadership positions later in their career, with the model age increasing from 43 in 1990 to 53 in 2000. An additional aspect of experience that has a direct bearing on this line of research also stems from Papa et al., where they identify that teachers who enter administration and move directly into a position as school principal do so at younger ages, have less teaching experience, and come from more competitive undergraduate universities (2002). This leads the authors to conclude that "more highly qualified individuals appear to progress to the principalship more quickly" (Papa Jr et al., 2002, p. 11). Since the rapidity with which teachers move from the classroom to leadership may be associated with quality measures, experience is a key variable to be included when examining movement into administration.

In summary, gender, earnings (absolute and relative to anticipated leadership earnings), and experience are likely to be associated with matriculation into school administration. The nature of administrative departures and geography, discussed below, are needed to more fully understand the choices teachers make when moving into their first leadership position.

III.4 Leadership Mobility

The research I pursue here is directed towards movement into school leadership. The research on leadership departures becomes pertinent to this line of inquiry when the conditions surrounding departure may influence conditions for the subsequent principal in that school. This relates directly to my third research question, which investigates the distribution of new leaders. As I examine the academic quality of schools at which a new leaders accept positions, factors that could influence measures of school quality (including leadership departures) need to be included.

Research investigating school leadership mobility between schools has largely mirrored findings on teacher mobility (Ebmeier & Hart, 1992; Hanushek, Kain, & Rivkin, 2004; Lankford, Loeb, & Wyckoff, 2002), namely that school environment exerts a strong influence on leaders' decisions to change schools (Gates et al., 2003; Gates, Ringel, Santibaŋez, Guarino, Ghosh-Dastidar,

& Brown, 2006; Loeb et al., 2010; Papa Jr et al., 2002; Ringel, Gates, Chung, Brown, Ghosh-Dastidar, & CA, 2004). In analyzing transfer patterns among principals in Miami-Dade County Florida from 2003 – 2008, Loeb, Kalogrides, & Horng (2010) observe that the proportion of students receiving free and reduced lunch is approximately 10% lower in the school principals transfer to than the school they transferred from. Interestingly, the authors also note that when such transfers occur they tend not to be associated with significant changes in the faculty composition (number of master's degrees and teaching experience), signaling "that principals may not be seeking out a more qualified group of teachers to lead when they transfer" (Loeb et al., 2010, p. 221). In an attempt to separate the demographics of the student body from correlated measures of school context, such as parental involvement, safety, or limited resources, the authors find that the inclusion of a school climate measure renders the significance of student demographics null in predicting principal mobility. It is possible that principals are moving in response to their knowledge of schools that present a context where leadership has the greatest opportunity to positively impact student outcomes. However, it is also possible that the faculty perceptions of school climate is artificially inflated upon the arrival of a new principal and/or artificially deflated prior to a principal's departure. It is also difficult to interpret this finding given that managing the school culture is a goal of school leadership; the Loeb, Kalogrides, & Horng (2010) finding may be evidence that the principals whose behavior is detrimental to the school climate are more likely to leave.

A similar methodological problem is encountered in a recent study by Miller (2010), which shows that principal departures are more likely to occur following a decline in student achievement. Here again we cannot know whether the principal's anticipation of leaving caused achievement to fall or whether the falling achievement caused the principal to leave (as the author concedes). Interestingly, Miller finds evidence of this decline, an "Ashenfelter dip," spanning into the new principal's tenure. The author reports that the dip, which begins up to four years prior to the transition, continues for two years after the appointment of the new principal before scores begin to climb again, returning to pre-transition levels within four years. These findings suggest that there

may be a four to eight year cycle of changing student achievement accompanying principal mobility. Unfortunately, the available data prevent Miller from controlling for the context surrounding the vacancy – firing, lateral voluntary transition, retirement, or promotion; or whether the transition occurred mid-year or over the summer. The way in which leadership successions are handled can have long-lasting implications for subsequent principal, faculty, and student success. "Creating and protecting substantial support systems for new principals that can pass on, share, and develop the essential inbound knowledge of incoming leadership" claim Fink & Brayman "seems to us to be a ... paramount priority of educational leadership reform" (2006, p. 85).

While succession planning may be a distant concern for most principals, finding a qualified replacement is often a challenging process. As may be expected, districts and schools that may be perceived as challenging work environments – typically poor or urban schools – have the most difficulty filling positions with qualified applicants (Normore, 2004; Roza et al., 2003; Stark-Price et al., 2006). While reporting this phenomenon, authors are careful to articulate that it is *qualified applicants* which are lacking. The finding that the number of qualified teachers with administrative certificates or licensure currently working within education far outstrips vacated positions appears to be surprisingly robust across locations and methods. Much as Ingersoll & Perda found when investigating claims of a teacher shortage 2009, the appearance of a limited supply of potential administrators is not owning to a lack of a qualified individuals. Rather, the shortage in administration could be interpreted to mean that qualified teachers do not perceive the additional demands and rewards of leadership to exceed the demands and rewards of teaching. The question for those examining the leadership labor market is then, how do the certified individuals who move into leadership differ from those equally qualified individuals who do not apply?

III.5 Geography

The final consideration of the labor research comes directly from research on teachers, namely their propensity to work close to home. Boyd, Lankford, Loeb, & Wyckoff (2005) compare the

hometown, college, and first teaching job locations for teachers in New York State. They find that 34% of new teachers accepted a job in their hometown and over 80% were within 40 miles of their hometown. Additionally, the authors also find that teachers return to similar locals as their home town: 88% of teachers growing up in an urban district find their first teaching position in an urban district (Boyd et al., 2005). When considering how this finding may relate to school leaders, two factors are worthy of consideration. First, teachers tend to move into school leadership after ten or more years in the classroom. Substantial teacher attrition over the first several years is well documented (Lankford et al., 2002; Loeb, Darling-Hammond, & Luczak, 2005); how Boyd et al.'s finding holds among the remaining teachers who do not attrit is uncertain. The other unknown aspect lies within the self-selection of teachers into school leadership. Those who have chosen to stay in education and have subsequently chosen to pursue leadership could equally be among the most or the least likely to stay close to home. Regardless, this line of research suggests that geographic location is a parameter worthy of consideration when examining job preferences and distribution within school leadership.

In summary, the literature provides direction regarding the key factors and findings that influence leadership labor decisions in education. Of the existing work on the leadership labor market, the majority of studies compare administrators to administrators – where are they located, how much are they paid, what are their qualifications, or how effective are they, as compared to their peers. These studies capture the complexity of interactions as principals move within the labor market. Although it is widely known that the school leadership labor market begins with classroom teachers, few studies have rigorously explored how teachers who go on to become school leaders compare to teachers who remain the classroom (or to those teachers who choose to leave the classroom and education as a whole). Of these the studies that have linked principals to their experience as a teacher, none have been able link student outcomes to teachers and subsequently link these teachers to their movement into leadership. The research presented here builds upon a solid and growing base of research by extending our line of sight down the labor supply chain,

looking inside of the classrooms of aspirant school leaders and comparing them to teachers who do not move into leadership positions.

CHAPTER IV

DATA

IV.1 Sample

This research uses state-wide administrative and student achievement data from a mid-sized south-eastern state from 2003-04 to 2010-11. The data combines administrative records with student-level test data, allowing for links to be made from students to teachers, while also following teachers as they move from the classroom into leadership positions. The state exam is a criterion referenced multiple choice test measuring reading and language arts, mathematics, science, and social studies knowledge of students in grades 3-8.

This data set is well suited to the research questions outlined above since: (a) the state data has been a reliable source for multiple studies using value-added measures; (b) there is considerable variation in the geographic location and organizational structure of school districts; (c) we have a complete panel with a large number of hiring schools; (d) salary data are included and represent the bulk of employee compensation; and (e) turnover and promotion are more likely to occur within the schools and districts, rather than between states (Papa Jr et al., 2002).

IV.2 Becoming a School Leader

To become a school principal or assistant principal, the aspirant school leaders must first apply to Local Educational Agencies (LEAs), which are typically collaborating colleges or universities that have met the state requirements that allows them to deliver preparation courses and issue administrative certificates. Following an application to an LEA, aspiring leaders must then complete the licensure program and apply for leadership positions.

As is common practice, the state requires that applicants to licensure programs hold a current teaching license and have at least one year of "successful education working experience;" for the majority of teachers this takes the form of traditional classroom instruction. Over the course of our study the state requirements for administrative licensure were stable, however in 2009 the state issued slight changes to the administrative certification requirements. The most substantial change was that applicants are required to have taught for three years rather than one year. Since the majority of new leaders have taught for five or more years, this policy change is of small significance to this study. The applicants are also required to document their ability to improve student achievement[1]. Preliminary licensure is given to those individuals who have a graduate degree, completed the certification program with the Local Educational Agency, and pass the state leadership exam (Praxis leadership exam, administered by ETS).

Table IV.1: Counts of Teachers and Schools with Value-Added Scores

	School Value-Added			Teacher Value-Added			
	Students	Schools	Teachers	Students	Teachers		
					no MA	2 year MA	3 year MA
2005	320,000	1,300	44,300	250,000	8,800		
2006	320,000	1,300	44,500	270,000	8,600	6,400	
2007	324,000	1,300	45,300	275,000	8,700	6,700	5,100
2008	329,000	1,300	45,800	277,000	8,700	6,800	5,500
2009	320,000	1,300	46,900	284,000	8,600	6,600	5,400
2010	311,000	1,300	46,600	290,000	8,400	6,600	5,500

Note: Each line shows the number of students used to calculate each VA measure as well as the number of teachers and schools for whom a measure was calculated. MA indicates a Moving Average.

[1]There are no documented requirements surrounding the evidence of improving student achievement; this criteria is determined locally by the district and the LEA

Table IV.1 provides a perspective on the number students that were included in school value-added and teacher value-added calculations (school value-added and teacher value-added serve as proxies for school and teacher quality; see Measures section). Also shown in table IV.1 are counts of the number of teachers for whom school and teacher value-added measures could be constructed. The first line of table IV.1 can interpreted to show that in 2005, 320,000 students used to construct school value-added measures for 1,300 schools and the 44,300 teachers teaching in those schools. Also in 2005, 250,000 students were used to construct teacher value-added measures for 8,800 teachers. In 2006 is the first year that a 2-year moving average (MA) can be calculated for teacher value-added, which drops the sample size from 8,600 to 6,400 because 2,200 of the 2006 teachers do not have value-added data from the prior year (they were likely new teachers or taught in a non-value-added subject such as k-3rd grade or art).

Records from 2004 were dropped as a lag year to calculate value-added scores; 2011 was used only to identify those individuals from 2010 who moved into leadership positions. The student sample used to calculate school value-added relies on student-school linkages and includes over 300,000 students each year. This represents approximately 80% of all tested students in grades 4-8 (3rd grade is also dropped as a baseline measure). The primary reason for the exclusion of 20% of tested students is that they did not have or could not be linked to a prior test score. This school value-added sample was used to calculate value-added measures for approximately 1,300 schools and 45,000 teachers per year.

The process by which teachers claim students adds structural restrictions and also introduces some error in the linking of students to teachers; thus teachers with individual value-added measures represent a sub-set of those teachers with school value-added measures. Table IV.1 shows the number of students used in the calculation of teacher value-added measures as well as the number of teachers with teacher value-added measures each year. In an attempt to temper some of the year-to-year variability in the individual value-added measures I have also constructed 2 and 3 year

moving averages (MA)[2].

Table IV.2: Counts of Teachers and New Administrators with Value-Added Scores

	School VA		Teacher VA					
					2 year MA		3 year MA	
	Teachers	New Admin	Teachers	New Admin	Teachers	New Admin	Teachers	New Admin
2005	43,771	240	7,717	56				
2006	44,422	230	7,666	43	5,868	33		
2007	45,174	260	7,731	54	6,163	46	4,764	35
2008	45,928	263	7,940	48	6,369	39	5,148	30
2009	45,088	145	7,741	29	6,151	26	5,068	24
2010	47,293	162	7,962	33	6,462	30	5,315	28
total	271,676	1,300	46,757	263	31,013	174	20,295	117

Note: Each line shows the number of teachers in the sample as well as the number of teachers that became new school leaders in the subsequent year. MA indicates a Moving Average.

Table IV.2 displays the number of teachers who move into a school leadership position in the subsequent year based on their value-added measure. Of the teachers with school value-added measures, approximately 150-200 move from instructional to leadership positions each year. For the teachers with individual value-added measures there are 30-50 teachers moving into school leadership per year; this number declines with the two and three-year moving averages. The modal number of yearly observations per teacher is three.

To address the first two research questions (pertaining to the quality measures and characteristics of promoted teachers) this study makes comparisons between two samples of teachers:

[2]4 of 1,424 schools moved from the 90th percentile to the 10th percentile (or vice-versa) over the six year panel; 44 of 1,424 schools moved from the 75th percentile to the 25th percentile (or vice-versa). Thus the within-panel school level value-added estimates appear fairly stable over time and no moving-averages were constructed.

all teachers and those teachers with administrative licenses. The "policy relevant" comparison is among all current teachers. The logic here is that all teachers are potential candidates to be recruited into a school leadership position. Examining comparisons in leadership matriculation among all teachers will allow us to question the existing policies, norms, and patterns that facilitate movement from teaching to school leadership.

The "pipeline relevant" sample addresses current leadership pipeline concerns by examining leadership matriculation among only those teachers certified or licensed in school administration. This group consists of a self-selected group of individuals who have met the existing state requirements for school leadership outlined above. Examining comparisons in leadership matriculation among licensed teachers will allow for a better understanding of selection from the existing pool of immediately available potential school leaders. The "pipeline relevant" comparison group (licensed teachers) are a sub-set of the "policy relevant" comparison group (all teachers).

CHAPTER V

MEASURES

V.1 Teacher Effectiveness

Defining instructional or school quality can be challenging to articulate in manner that lends itself to direct measurement. Goe (2007) differentiates between teaching quality, teacher quality, citing Fenstermacher and Richardson (2005) to clarify:

> Quality teaching could be understood as teaching that produces learning. In other words, there can indeed be a task sense of teaching, but any assertion that such teaching is quality teaching depends on students learning what the teacher is teaching. To keep these ideas clearly sorted, we label this sense of teaching *successful teaching*. (p. 186)

Goe (2007) continues, articulating a framework for teacher quality that includes inputs, processes, and outputs. Input measures include teacher qualifications, such as education, certification, and experiences, as well as teacher characteristics, such as gender, race, or self-efficacy. Process measures refer to teacher practices (teaching quality) and include classroom management, planning, and instructional delivery. In this framework, the outcome measures are teacher effectiveness, defined to be the average gain in student outcomes, above and beyond any expected gains (Goe, 2007). Teacher effectiveness is then a manifestation of teacher quality resulting from each teacher's set of qualifications, characteristics, and practices.

Research on teacher quality that establishes strong links between inputs and outcomes is sparse. Findings on the impact of certification, preparation, undergraduate degree, advanced degree, National Boards Certification, or quality of undergraduate university are typically small and vary by sample and method (Goldhaber & Brewer, 1997; Glazerman, Mayer, & Decker, 2006; Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2006; Clotfelter, Ladd, & Vigdor, 2007; Goldhaber &

Anthony, 2007; Harris & Sass, 2009). The most consistent evidence suggests that teacher experience has positive effects on student achievement, however selection bias within schools, between schools, and attrition bias presents a substantial challenge to this claim and evidence to the contrary does exist (Betts, Zau, & Rice, 2003). Research surrounding teacher characteristics such as student-teacher racial matches shows some positive effects (Dee, 2004), while other research is inconclusive (Ehrenberg, Goldhaber, & Brewer, 1995). Investigations regarding teacher character traits, such as self-efficacy have not been able establish links to student learning (Goddard, Hoy, & Hoy, 2000).

Some confusion has arisen around the use of student-outcomes as measures of teacher quality. "A major source of confusion appears to be the circular nature of the line of argumentation that attempts to define teacher effectiveness in terms of estimated teacher effects" (Kupermintz, 2002, p. 229). Unlike a variable such as teacher preparation, which we may interpret as a causal factor in raising student achievement, instructional quality cannot cause increases student achievement – instructional quality is *defined* as increases in student achievement. The use of student gains to define instructional quality is not problematic within the context of this research. The line of inquiry pursued here is motivated by the prospect that high instructional quality or teachers from high-quality schools may become high-quality school leaders. Under this approach, changes in student outcomes are used to identify teachers of varying quality; differential matriculation into leadership will be evaluated conditional upon this measure. While it is possible that being a high value-added teacher does exert a causal effect on the propensity for leadership (if, for example, a teacher's skill is recognized by school or district leaders who then help pave the path towards leadership), that particular causal claim is neither made nor evaluated through this line of research. A notable limitation of this research is that value-added measures are only available for teachers in tested subjects; special education, art, music, and even third grade teachers (because there is no prior baseline) cannot be evaluated by this measure. And yet, if the results from this inquiry prove promising subsequent research may explore the relationship between additional measures

of instructional quality (observations, National Boards Certification, etc.) and school leadership matriculation.

The use of value-added estimates in defining teacher quality has been disturbing to some educators who rightly point out that the contributions of excellent educators cannot be adequately summarized by the change in a test score. This argument carries substantial weight since excellent teachers strive to develop the student as a whole, focusing on emotional, social, as well as intellectual growth. However a teacher who neglects academic achievement at the expense of other domains cannot be rightly classified as an exceptional educator. This research presumes that the aspects of exceptional teachers that may reasonably make them exceptional instructional leaders are those skills surrounding instruction and the cultivation of knowledge. Milanowski (2004) provides some substance to this assertion as he found that, based on an evaluation of Ohio teachers consisting of six observations and a portfolio analysis, "[t]he results also suggest that teacher [value-added] scores may be useful as representations of teaching practices that affect student learning." Kane et al. (2010) also found that observational measures of high quality instruction corresponded to teachers' value-added estimates. Lastly there is reason to believe that high (or low) value-added teachers can have a cumulative effect on children, impacting students subsequent academic outcomes (Sanders & Rivers, 1996) and long-term economic productivity and social well-being (Chetty, Friedman, & Rockoff, 2011; Rockoff, 2004)

The key variables in this line of research are the measures of school and instructional quality. There are several challenges to quantifying these quality measures, such as establishing continuity of the assessment over time, the determination of an appropriate baseline, and limiting measurement error. The state exams are vertically aligned, criterion-referenced, and use item-response theory to generate scale scores. Speaking to the continuity of the assessment over time, over the course of the data panel a testing change resulted in a re-scaling of the exam. To accommodate this change standardized scale scores were constructed by grade and year. This results in a slight

change in the interpretation of the scores, which now should be regarded as the child's relative position in the achievement distribution.

To address the second challenge of baseline selection, the fixed-effects models (shown below) use lagged achievement when estimating current achievement, thereby measuring any change in achievement relative to the prior year (Kane & Staiger, 2008). The teacher (or school) fixed-effects provide each teacher (or school) with their own intercept where this intercept is then interpreted to be the added effect of being in that particular classroom (or school) after controlling for prior achievement. As McCaffery points out in Springer (2009), "Fixed-effect and mixed-model methods are highly correlated and disagree on just 10% of teachers ... Moreover, the differences between these two methods are not persistent" (p. 142). In the model below I have also included squared and cubic terms of lagged achievement to more accurately represent any non-linear relationships in between lagged achievement and current achievement.

The third challenge pertains to measurement error in the achievement scores. At an extreme, if lagged achievement were entirely stochastic we would expect the teacher fixed-effects to be predicting absolute achievement rather than growth and thus be severely conflated with students' socioeconomic status. Since value-added estimates are known to be fairly noisy measures (Guarino, Reckase, Wooldridge, Haider, Bargagliotti, Dieterle, Stacy, & Smart, 2011), I use an instrumental variables approach to mitigate a portion of the measurement error. In the first stage equation I use the first, second, and third order polynomials of lagged reading and language arts, science, and social studies scores as excluded instruments to predict lagged math scores. The logic of this approach is that any measurement error that is unique to the math score will be uncorrelated with the other scores. When the lagged math score is predicted using this first stage equation it will only contain information common among all four assessments. By extension, any measurement error that is also common to all assessments will not be expunged by this process (Angrist & Krueger, 2001).

The model used to estimate the teacher value-added estimates is as follows:

$$math_{ij(t-1)} = \beta_0 + \beta_1(rla_{ij(t-1)}) + \beta_2(rla_{ij(t-1)})^2 + \beta_3(rla_{ij(t-1)})^3 ... + \mu_{ijt}$$

$$math_{ijt} = \beta_0 + \beta_1(\widehat{math_{ij(t-1)}}) + \beta_2(\widehat{math_{ij(t-1)}})^2 + \beta_3(\widehat{math_{ij(t-1)}})^3 + \beta_g(grade_i jt) + \mu_{ijt}$$

The equation above will model student *i*'s math score in year *t* as a function the student's predicted math score in the prior year. The model was estimated separately for each of the six years in the panel. The school or teacher associated with the student is indexed by the subscript *j*. To further address year-to-year variability in teacher value-added measures, I have also calculated two and three year moving averages. School value-added was substantially less volatile over time and no moving averages were used. Not shown in the equations are a set of dummy variables for the proportion of time a given teacher contributed to a students overall math instruction; this variable accounts for time divided between teachers within or between schools.

It would be problematic if the teacher value-added measure were to be conflated with aspects unrelated to instructional effectiveness that are also predictive of leadership matriculation. One such example could be that a principal favors a teacher with additional resources (such as smaller classes) that make a teacher more effective and concurrently taps this teacher for later leadership roles. To address this possibility, class size has also been included in all teacher value-added models.

V.2 School Value-Added

As Harris (2009) points out, value-added estimates are subject by multiple assumptions, many of which are almost certainly not upheld within the current schooling paradigm. Some of these assumptions include the random assignment of students, no differential student peer-effects, and no differential teacher peer-effects. However, Harris also notes that many value-added models appear to be robust to small or moderate deviations from these assumptions. In contrast to teacher value-

added models, school value-added models have received far less attention and rigorous study. This is, in part, owing to two significant challenges encountered when one attempts to extrapolate the teacher model into the school setting. First, the assumption that students are randomly assigned to schools is far less tenable than for random assignment to teachers. Second, when estimating teacher value-added the assumption that the teacher did not influence the students' prior scores is likely viable in the absence of strong student sorting or teacher peer effects. In contrast, a school does (or at least should) play a role in students' prior scores, especially when that student was in that school during the prior year. If all students stayed in one school for grades k-8, we could interpret school value-added to be a marginal value-added – the value-added controlling for a portion of each schools' prior value-added.

School value-added presents unique challenges, however as used in this context, it is a viable measure. First, the above challenges have not prevented school value-added from being calculated and used in a policy context. In this state, as in others, school value-added scores are publicly available and tied to school improvement and accountability plans. Second, despite the flaws listed above, school value-added measures provide a better alternative than using raw achievement. Unlike raw achievement, school value-added attempts to control for a portion of prior achievement. Lastly, non-random sorting of students into schools implies that school value-added may be conflated with non-academic influences such as SES, however the modeling approach used here includes raw achievement as a way for examining school value-added while controlling for a portion of the bias in the measure. The school value-added measure used in this context provides an approximate measure of student growth within a school as compared to other schools.

V.3 Control Variables

The extant literature on teacher and principal labor markets provide insightful guidance regarding the inclusion of additional variables that may also play a role in a teacher's matriculation into

leadership. Chief among these variables are teacher gender (Joy, 1998) and compensation (Brewer, 1996). Experience is also a predictor of movement into leadership, however as a result of collective bargaining agreements, salary schedules in education are highly correlated with experience. In this data set, because years of experience is not available, I use base income as a proxy for experience. Since salary schedules vary from district to district, I have created within district income quintile dummy variables. These within district base income quintiles serve as controls for teachers' years of experience. Overall compensation is included as a continuous variable consisting of a teacher's teaching salary as well as any supplemental income from activities such as coaching or teaching additional classes.[1]

Evidence suggests that school achievement and student demographic composition relate to both teacher and principal mobility patterns; accordingly average school achievement in math and the proportion of white and English language learner (ELL) students in a school are also included in the analysis.

Descriptive statistics and a correlation table are shown in the Appendix (IX.1 and IX.2, respectively). Table IX.3, also in the Appendix, parses descriptive statistics between the "policy relevant" sample (all teachers) and the "pipeline relevant" sample (administratively licensed teachers).

[1]For ease of interpretation I have not used the natural log of income. This does not change the substantive or statistical significance of my findings.

CHAPTER VI

METHODS

VI.1 Identification Strategy

The goal of this research is to determine if there is evidence that instructional or school quality is associated with differential matriculation into leadership positions. To do this I make comparisons among classroom teachers. Because all teachers are conceivably eligible to become school leaders after one year of teaching experience, it is reasonable to include all teachers in the comparison group[1]. Specifically, I have identified a teacher as an individual who had been assigned an instructional assignment code. These primarily include art, music, physical education, special education, and classroom teachers. School leaders are individuals who held formal positions as principals or assistant principals. A small number of individuals (primarily in rural districts) have split teaching/administrative assignments; such individuals are identified as school leaders if more than half their time is allocated to a leadership position. A new leader is defined as an individual who was a teacher and later moved into a leadership position; such individuals are coded as 1 for all observations in their panel. There were no included instances of school leaders who later became full-time teachers.

VI.2 Analytical Models

Research questions one and two, pertaining to differential movement into leadership, are addressed using a probit model where moving into leadership is the dependent variable. The independent variables are school and/or instructional quality, the percent of white students in the school, aver-

[1] Although teachers could move into leadership positions after one year, this is not the probable event. Instead teachers tend to stay in the classroom for 5-10 years before moving into leadership. In results not shown, I have also run these models limiting the sample to only teachers in the 3rd, 4th, or 5th income quintile. This restricted sample generates results that are statistically and substantively congruent with the findings presented in the results section.

age school math achievement, teacher gender, the percent of students classified as English language learners, and teachers' income quintile. Models also include year fixed-effects, dummy variables for the state's six largest districts, and standard-error adjustments for repeated observations on individuals over time. Variables are indexed by teacher (i) and year (t).

$$move_{it} = \beta_0 + \beta_1(SchoolVA_{it}) + \beta_n(X) + \mu_{it}$$

$$move_{it} = \alpha_0 + \alpha_1(SchoolVA_{it}) + \alpha_1(TeacherVA_{it})\alpha_n(X) + \mu_{it}$$

Research question three, pertaining to the characteristics of the schools hiring the new leader, is addressed using OLS regression where instructional or school quality are the dependent variables. The dependent variables here are characteristics of the hiring school and include: a dummy variable for whether or not the school is in the same district as the school from which the new leader came; a dummy variable for whether or not the new leader taught at that school; income (as a leader); school math achievement; school demographics; and school value-added. These models also contain year fixed-effects and dummy variables for the state's six largest districts. Variables are indexed by teacher (i) and year (t).

$$ValueAdded_{it} = \gamma_0 + \gamma_1(VAofHiringSchool_{it}) + \gamma_n(X) + \mu_{it}$$

VI.3 Missing and Erroneous Data

Missing data was imputed for student data when a student had both a math score and lagged math score, yet was missing a lagged reading and language arts, science, or social studies exam. Data missing in this pattern represented 6% of student records. These missing data were imputed using a Multiple Chain Monte-Carlo (MCMC) multiple imputation procedure with five imputations for records with missing data (Rubin, 1987). Adequate chain convergence was determined graph-

ically (Brooks & Gelman, 1998) and confirmed using the Gelman-Rubin diagnostic (Gelman & Rubin, 1992). Autocorrelation was determined graphically and the thinning interval was adjusted accordingly.

Administrative records had very few records with missing data, however there were some instances when data appeared to be inconsistent. For example, at times teacher gender would change for one year; in such situations the gender was replaced with the modal gender for all observations of that individual across the panel. Such changes were made in less than 1% of administrative records. Teachers that retired at any point during the span of this data were removed from the analysis on the assumption that teachers approaching retirement are not candidates for school leadership although 41 of 3,106 of these records represented teachers with administrative licenses.

CHAPTER VII

RESULTS

This line of research is motivated by a need to better understand the labor supply of school leaders. Towards that end, I first present a descriptive overview comparing those entering school leadership with their colleagues who remain in the classroom. In this section I describe this sample with respect to geographic mobility, teaching assignments, types of school leadership positions, income, school achievement, race, and value-added.

With respect to patterns in geographic mobility, a third of new-leaders move to leadership positions in the same school at which they taught. Eighty percent of new-leaders move to leadership positions in the same district. When the sample is restricted to the state's six largest districts, 97% of new leaders stay in the same district. This finding speaks to Lortie's claim that districts place a premium on individuals' localized knowledge of the schooling context when hiring school leaders (Lortie, 2009). Viewing this finding from the perspective of labor supply, it may also be the case that individuals, established in their career, may also be socially established in a given locale and are only pursuing leadership positions within a limited geographic region.

Figure VII.1: Gender Differences

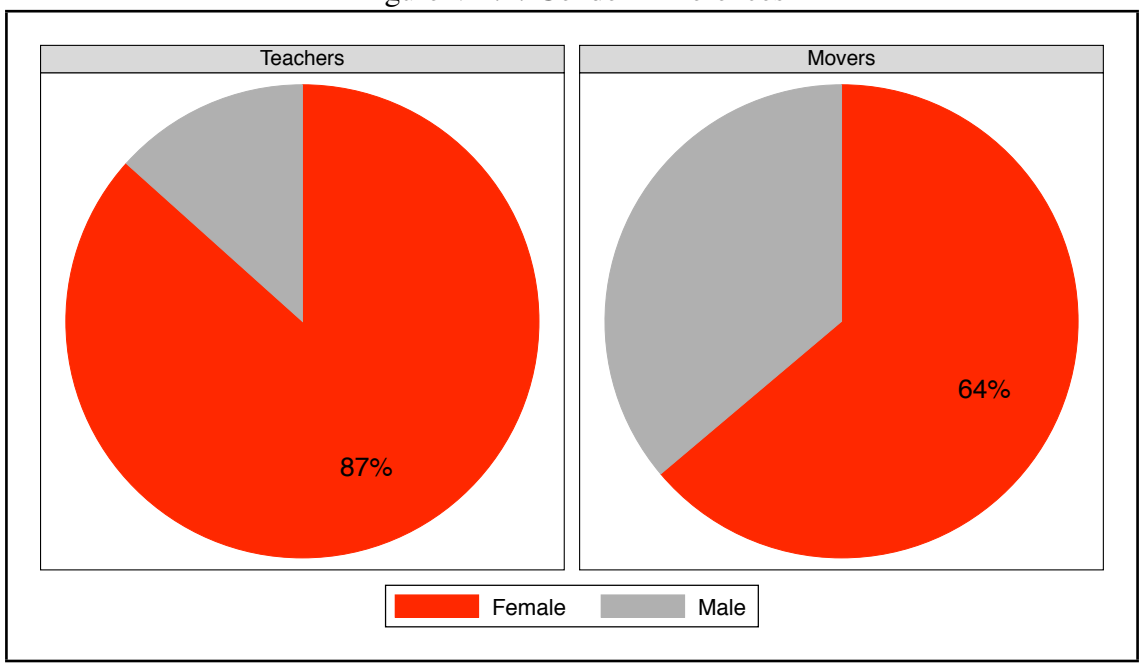


Figure indicates gender distribution of all teachers (left panel) as compared with those teachers who subsequently moved into leadership positions (right panel).

Figure VII.1 shows the differences in gender between those moving into leadership and those remaining in instructional positions. In addition to underscoring the asymmetry in gender between males and females as previously emphasized by (Joy, 1998), Figure VII.1 also highlights the dynamic and changing nature of the school leadership labor market. In 1988 the gender composition of the teachers was virtually identical to the composition in the past decade, however women only occupied 22% of all elementary principal positions. In just over two decades the proportion of women in the leadership labor market has grown three fold. Nonetheless, there remains a sizable gender disparity between the proportion of females in the classroom and and those in school leadership (87% compared to 64%).

Teachers occupy a multitude of instructional positions prior to moving into leadership positions, as is shown in Figure VII.2. The panel on the left (Teachers) shows the instructional positions held by teachers who did not later move into school leadership. The panel on the right(Movers) shows the instructional positions of those who did make a move into school leadership. By compar-

ing the two we can get a feel for whether or not teachers of various subjects are equally represented among school leaders. For example, 3.33% of all teachers teach physical education and 4.02% of all new school leaders also taught physical education, this shows a parity among this group within school leadership. Figure VII.2 makes clear that teachers in the five value-added grades (i.e., those likely to have value-added scores, shown in red) tend to move into school leadership roles at disproportionately high rates. While these individuals make up 35% of the teachers in this sample, they constitute over half of all new leaders[1].

Figure VII.2: Classroom Roles

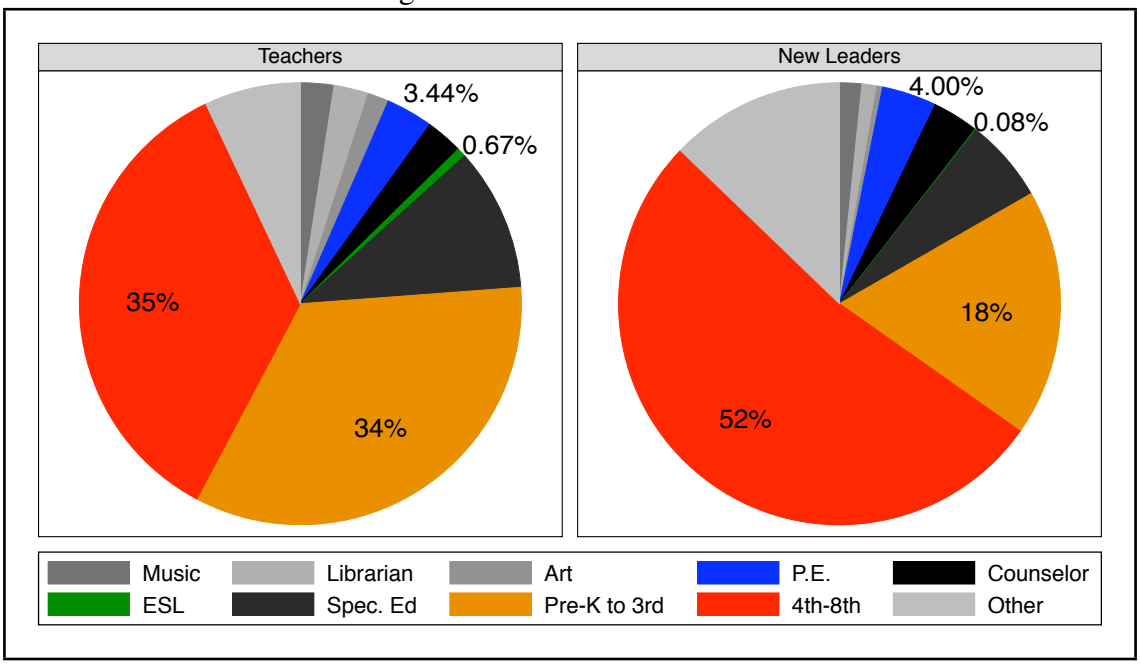


Figure indicates instructional positions held by all teachers (left panel) as compared with those teachers who subsequently moved into leadership positions (right panel).

The disproportional matriculation of value-added teachers into school leadership makes one wonder if such a finding may, in part, be an implication of the school accountability movement. It may be that schools are more likely to hire individuals who have demonstrated the ability to successfully prepare students in a high-stakes context (since value-added is most often calculated for high-stakes evaluations). Such teachers may work well under pressure, understand how to navigate

[1]Teachers in grades 4-8 account for 35% of all teachers, however among teachers with administrative licenses, those in grades 4-8 constitute 43% of all teachers.

education through external policy constraints, or be able to prioritize learning goals and classroom activities to maximize measurable student outcomes – all of which may be perceived as advantageous characteristics for a school leader in the current policy environment.

Figure VII.3: Leadership Roles

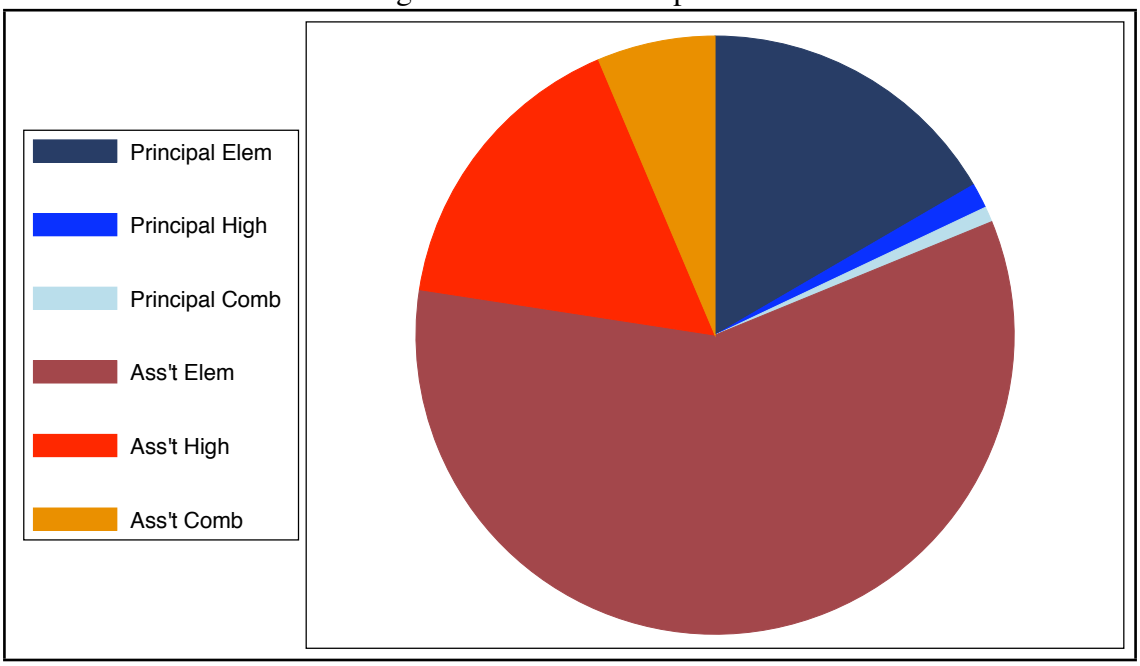


Figure indicates positions taken by new leaders. Combo indicates a leadership position accepted at a combined k-12 school. Ass't indicates a position taken as an assistant (or vice) principal.

Table VII.3 shows the types of positions that new leaders accepted. Expectedly, the majority (81%) of all new leaders moved into a position as an assistant principal, as shown by the combined area of the maroon, red, and orange slices. A notable proportion of teachers moved directly from a teaching position into a role as principal; this mobility pattern was far more prevalent in rural districts. Table VII.3 also shows that most teachers from k-8 subjects (75%) accepted leadership positions in elementary schools. Teachers in urban districts were more likely move into leadership positions in high schools, as were female teachers.

Figure VII.4: Context Comparisons

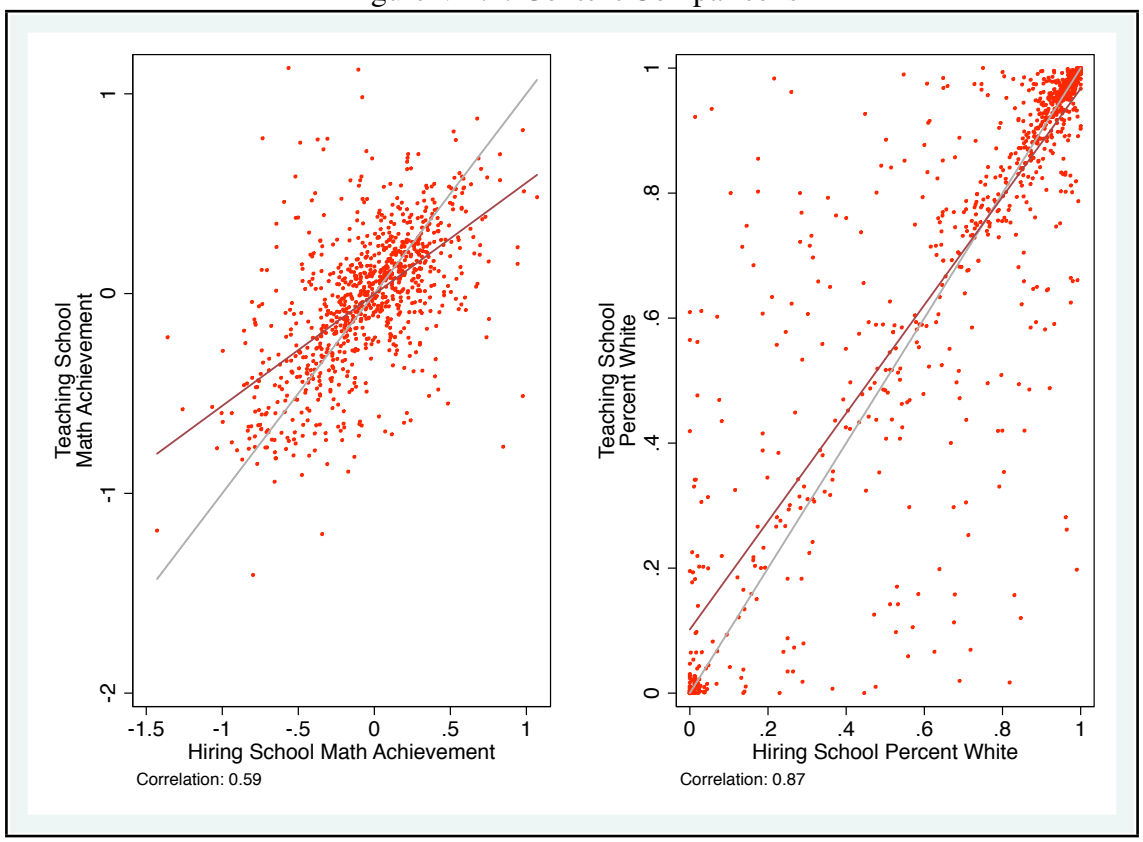


Figure indicates how the school in which a teacher taught (y-axis) differs from the school in which they were hired (x-axis). Left panel depicts average school math achievement (standardized); right panel depicts the percent of white students. The gray line provides a 1:1 reference while the red line is a linear trend line.

Distributional patterns have been of interest to labor economists and education advocates alike. Figure VII.4 presents a comparison of school achievement (panel 1) and the racial characteristics of students in the schools (panel 2). The measure pertaining to the school in which the new leader worked as a teacher is represented on the y-axis while the measure pertaining to the school in which they were hired as a leader is represented on the x-axis. The light gray line shows a one-to-one correspondence between the measures, implying that the achievement (or student race) at their teaching school was the same as at their leading school. The darker line shows a linear fit between the two measures. For both achievement and student composition there is a pattern of moving towards a similar school. In panel 1, we see that individuals who taught in high achieving schools tend to move into leadership positions in schools with even higher achievement. Con-

versely, those who taught in lower performing schools tend to move into leadership positions in even lower achieving schools. Panel 2 of Figure VII.4 shows that individuals who taught in schools with primarily white students tend to accept leadership positions in schools with primarily white students and, conversely, those who taught in schools with primarily non-white students tended to move into leadership positions in schools teaching primarily non-white students as well.

The final descriptive measure presented here addresses the continuity of individual value-added scores over time. Depending on what is motivating the change from teaching to leadership, we may expect either a dip or a rise in performance prior to the move. In other work, Cullen & Mazzeo (2010) noted an "Ashenfelter's dip" – a reduction in school value-added to precede a principals' departure from a school. An increase in teachers' value-added scores prior to a leadership move could suggest that teachers plan to use their record of success to help land the best leadership job, or perhaps they want to "go out on a high note." Conversely, a drop in value-added scores prior to a leadership move may suggest that teachers are burned-out or have re-prioritized their time and effort as they anticipate their next position. A supplemental fixed-effects probit regression analysis examining within teacher variation showed no significant difference between the value-added measure in the year prior to moving into leadership (their last year as a teacher) and the value-added in other years when the sample was restricted to leadership movers with three or more years of value-added scores. This suggests that a teachers' instructional quality does not change significantly as they depart the classroom.

In summary the descriptive findings have shown that the labor market is small and largely defined by district boundaries, men are over-represented in leadership, relative to their proportion in the teaching force, teachers in value-added subjects are over-represented as new leaders, most new leaders take positions as assistant principals, new leaders move to schools that are similar to the schools in which they taught, and there is no appreciable dip in value-added in the year prior to their move into leadership. In the next section I turn to the three analytical questions outlined at

the start of this paper.

VII.1 Measures of Quality

The first and second research questions investigate the extent to which school and instructional effectiveness are related to a teacher's movement into a leadership position. The results to these questions are shown in Tables VII.1 and VII.2. Table VII.1 shows the probit results of two analyses (estimates for year and large district dummies are not shown), model 1 includes all teachers (the "policy relevant" sample), while model 2 restricts the sample to only those teachers with administrative licenses (the "pipeline relevant" sample).

Table VII.1: School Quality & Leadership Matriculation

		(1) All Teachers		(2) Teachers with Admin. Licenses	
		Coef	SE	Coef	SE
School VA		0.348*	(0.161)	0.126	(0.237)
School % White		-0.037	(0.103)	-0.073	(0.150)
School % ELL		0.064	(0.095)	0.012	(0.132)
Math Achievement		-0.207**	(0.069)	-0.083	(0.101)
School Enrollment		0.029***	(0.007)	0.019	(0.010)
Teacher Gender (male)		0.804***	(0.042)	0.583***	(0.059)
	2	0.395***	(0.043)	0.316***	(0.064)
Experience	3	0.526***	(0.061)	0.420***	(0.083)
Quintile	4	0.851***	(0.075)	0.220*	(0.104)
	5	1.011***	(0.095)	-0.073	(0.132)
Gross Income		-0.195***	(0.043)	-0.198***	(0.057)
Observations		269,878		33,096	

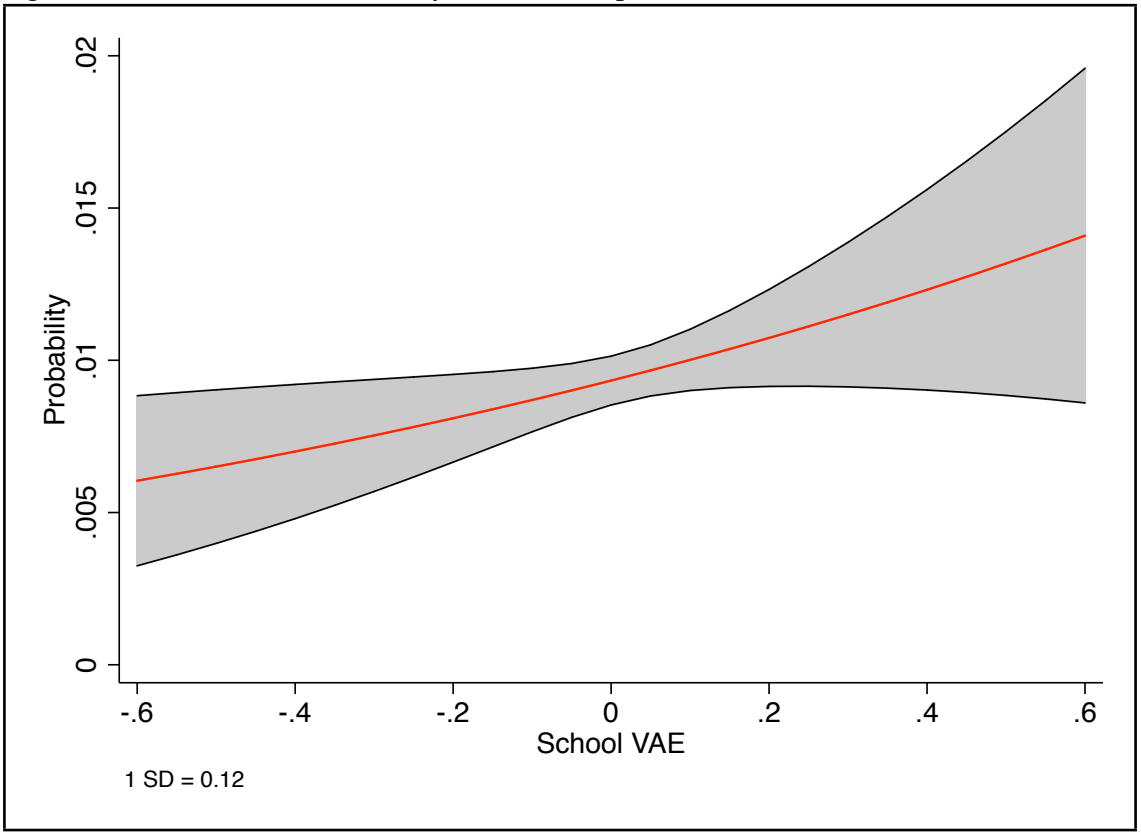
† indicates $p < 0.10$, * indicates $p < 0.05$, ** indicates $p < 0.01$, *** indicates $p < 0.001$
The table above presents the results of a probit regression model predicting teachers' matriculation into school leadership. The sample in model 1 includes all teachers with school-level value-added measures; the sample in model 2 includes all teachers with both school-level value-added measures and administrative licenses. Coefficients are marginal probabilities.

When we examine comparisons among the policy relevant sample (all teachers; model 1) we see that school value-added is positively associated with movement into school leadership (School VA = 0.348). The magnitude of this relationship is moderate, yet on the cusp of statistical significance. Interpreting the coefficient into more practical terms this means that teachers from schools in the lower 5% of the school value-added distribution have a 0.79% chance of moving into school leadership as compared with their colleagues in a school in the top 5%, who have a 1.16% chance of a leadership move (see figure VII.5). Another way to consider the magnitude of this finding is to consider that the coefficient on school quality is slightly less than half the size of the gender and experience (quintiles 4 and 5), the largest predictors of leadership matriculation across the literature. The small probabilities reflect the nature of this low-probability event, however the relative probabilities show that teachers in top schools are almost one and a half times as likely to move into school leadership.

Looking further, we see that teachers from high achieving (rather than high growth) schools are *less* likely to move into school leadership (Math Achievement = -0.207). With school value-added in the model, average school math achievement is likely a proxy for the more affluent, higher achieving schools. If all leadership hiring were done on political and/or social connections, we may expect that individuals working in the highest achieving (and most socially-connected) schools to be first in line. These results tell a different story, suggesting that it is teachers in lower achieving schools that are more likely to move into school leadership.

A school's student composition (percent white and percent ELL), are not significant predictors a teachers likelihood to move into school leadership. School size (scaled in terms of 100 students) shows a very modest positive association with movement into leadership. Larger schools typically have more individuals assigned to administrative positions. Larger schools then provide a greater opportunity for an administrator to match with a teacher and encourage them into a leadership role. As expected, the experience quintile dummy variables show a positive relationship to ma-

Figure VII.5: Predicted Probability of Leadership Matriculation and School Value-Added



The red line indicates the predicted probability of leadership matriculation from the "policy relevant" sample estimated by model (1); 95% confidence intervals are depicted by the gray region on either side of the red line. Curvature of confidence interval is a function of the probit model.

triculation, affirming that teachers with more experience are more likely to move into leadership positions. Gross income shows a negative relationship (-0.195), suggesting that after controlling for experience, teachers with higher incomes are less likely to move into school leadership. This is likely evidence that the teacher-leader salary differential is partially motivating the move into school leadership.

A key difficulty in labor market studies is disentangling selection on the part of the labor supply from selection on the part of the labor demand. The preceding analysis showed that school value-added has a positive relationship with movement into leadership, however there are two scenarios that could produce such a situation, each with distinct policy implications. One possibility is that teachers from higher value-added schools are more likely to obtain administrative licenses

and thus make up the bulk of leadership applicants. The other possibility is that school quality has no bearing on administrative licensure and schools are preferentially hiring new leaders who taught in higher value-added schools. The first scenario implies that selection occurs primarily on part of labor supply; the second scenario implies selection on the part of labor demand. The second analysis (model 2) in Table VII.1 restricts the sample to only those teachers who hold administrative licenses in a given year (the pipeline relevant sample). The results show that the relationship between school value-added and leadership matriculation is no longer significant. This implies that the differential selection appears to take place within the labor supply, prior to the hiring process.

Also of note in the restricted analysis shown in Table VII.1 is that the magnitude of the coefficients on the experience proxies are reduced. Such a reduction may indicate that among licensed individuals, those with more years of experience are still more likely to move into leadership, with one important exception: Teachers with the most experience (5th experience quintile) are no more likely to move into school leadership than are those with the least experience (1st experience quintile; the comparison group). This may be a result of experienced licensed teachers who have no incentive or desire to move into school leadership. The final inference gleaned from the restricted sample analysis in Table VII.1, is that the coefficient on teacher gender (Male) is also substantially reduced, suggesting that being male plays a greater role in obtaining an administrative license as compared to moving into leadership positions after a license has been obtained.

Results for research question two, pertaining to the relationship between instructional quality and leadership matriculation is shown in Table VII.2. Here we see evidence suggesting that teachers of higher instructional quality as measured by teacher value-added are more likely to move into school leadership (Teacher VA = 0.502)[2]. Again, some perspective can be gained by considering the predicted probability rather than the marginal probit coefficient. In this case, a teacher in the

[2]Table IX.4 provides several robustness checks using "policy relevant" sample analyzed by model (3). Similar results are obtained when using two or three-year moving averages as well as using a teacher value-added measure constructed with two-year student lag scores.

Table VII.2: Instructional Quality & Leadership Matriculation

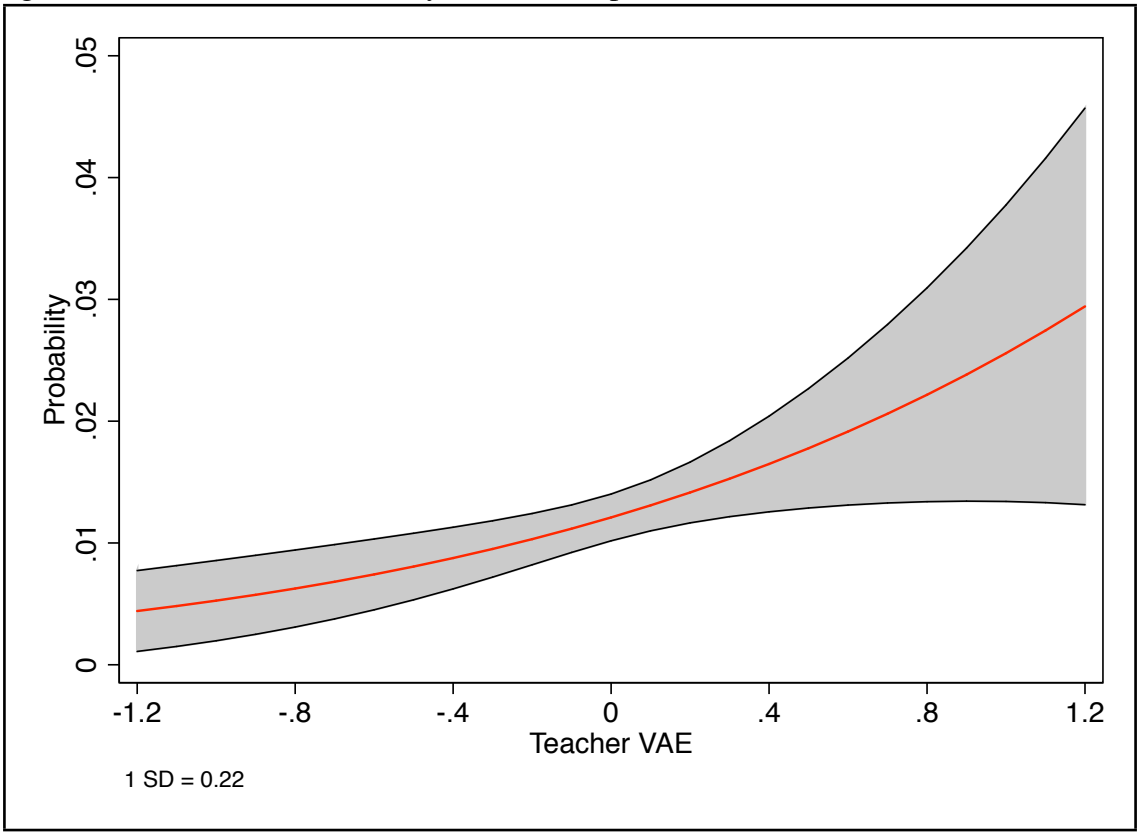
		(3) All Teachers		(4) Teachers with Admin. Licenses	
		Coef	SE	Coef	SE
Teacher VA		0.502***	(0.144)	0.361	(0.199)
School VA		0.394	(0.369)	0.340	(0.528)
School % White		0.032	(0.205)	0.192	(0.295)
School % ELL		-0.320	(0.168)	-0.372	(0.236)
Math Achievement		-0.376*	(0.153)	-0.243	(0.221)
School Enrollment		0.023	(0.016)	0.023	(0.023)
Teacher Gender (male)		0.873***	(0.083)	0.572***	(0.115)
	2	0.382***	(0.091)	0.266*	(0.130)
Experience	3	0.700***	(0.123)	0.576***	(0.163)
Quintile	4	1.106***	(0.155)	0.460*	(0.210)
	5	1.364***	(0.192)	0.262	(0.265)
Gross Income		-0.487***	(0.096)	-0.470***	(0.132)
Observations		46,059		6,813	

† indicates $p < 0.10$, * indicates $p < 0.05$, ** indicates $p < 0.01$, *** indicates $p < 0.001$
The table above presents the results of a probit regression model predicting teachers' matriculation into school leadership. The sample in model 3 includes all teachers with individual value-added measures; the sample in model 4 includes all teachers with both individual value-added measures and administrative licenses. Coefficients are marginal probabilities.

bottom 5% of the value-added distribution would have a 0.85% percent chance of moving into a school leadership position. In contrast, a teacher in the top 5% would have a 1.64% chance (see Figure VII.6). Again, these probabilities are low as they reflect the unlikely event that anyone moves from teaching to leadership, however a comparison of the top and bottom teachers suggests that top teachers may be twice times as likely to move into school leadership.

In this analysis, school value-added is not significant, however the similar magnitude of the coefficient to that shown on Table VII.1 suggests that the five-fold drop in sample size may have resulted in a substantial loss of precision rather than a differential effect of school value-added

Figure VII.6: Predicted Probability of Leadership Matriculation and Teacher Value-Added



The red line indicates the predicted probability of leadership matriculation from the "policy relevant" sample estimated by model (3); 95% confidence intervals are depicted by the gray region on either side of the red line. Curvature of confidence interval is a function of the probit model.

within this sample. The remaining variables are largely in keeping with those presented in Table VII.1, namely being male, increasing experience, lower income, larger school size, and lower school-wide math achievement are related to an increased propensity to move into leadership positions.

When I restrict the sample to the pipeline relevant teachers (model 4), we see that teacher value-added is no longer significant. Thus, it appears that it is primarily the higher value-added teachers who hold leadership licenses, regardless of whether or not they move into school leadership. As with the results from the first research question, we also see that math achievement is not significant in this sub-population, the coefficient on male drop appreciably, the experience proxies are reduced, and the coefficient on income remains the same.

Figure VII.7 shows the overall predictive power of model 3 (including all teachers, measuring teacher and school value-added) relative to the naive estimate. The uninformed naive estimate, shown as a vertical line, represents the 1.8% of teachers who move into school leadership. The curved gray line represents the predicted probability that a teacher moves into school leadership for those teachers who do not move into leadership and the red line represents the same probability for teachers who do move into administration. A highly predictive model would show that individuals who move into leadership to have predicted matriculation rates higher than the naive estimate and those who do not move into leadership to be lower than the naive estimate. In Figure VII.7 we see that, to the left of the naïve estimate, the population is dominated by teachers who do not move into leadership, where as to the right of the naive estimate teachers who do move into leadership dominate. As expected by the significant findings presented above, conditioning on teacher and school characteristics produces more informed estimates. However, Figure VII.7 also shows evidence of misclassification; that is, individuals who do move into school leadership are occasionally predicted to be *less* likely to do so than are teachers who remain in classroom (as shown by the red line to the left of the naive estimate and the gray line to the right). This suggests that there are other omitted variables that may be related to leadership matriculation (e.g., the number of applications submitted, then number of schools within 25 miles of home, total family income, etc.).

The preceding analyses set out to explore the relationship between school and instructional quality and a teacher's propensity to move into school leadership. When considering the "policy relevant" sample of all teachers eligible to move into school leadership it appears that both school and teacher value-added are significant, positive predictors of matriculation from teaching to school leadership. However neither of these quality measures were significant predictors of leadership matriculation in the "pipeline relevant" sample of teachers with administrative licenses. School demographics (% White and % ELL) were never significant predictors and gross income displayed a consistent negative relationship to leadership matriculation. Being male remained the the single

Figure VII.7: Predicted Probability of Matriculation and Teacher Value-Added

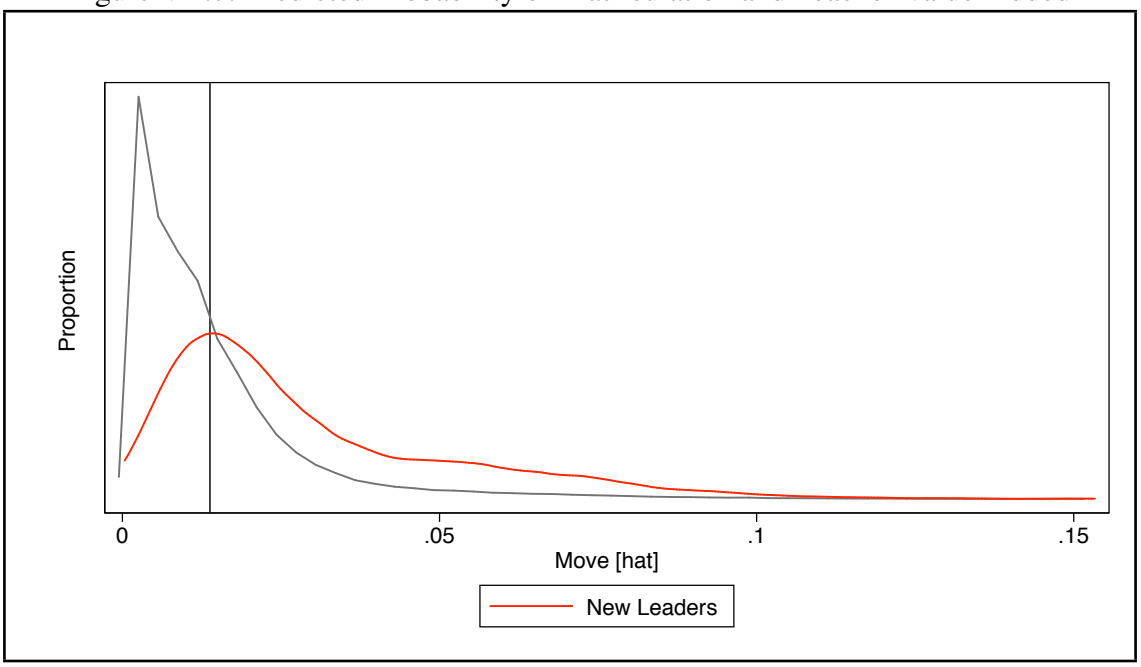


Figure indicates the predictive power of the model, in this case model 3 – the "policy relevant" sample that includes all teachers. The vertical line represents the naïve leadership matriculation estimate of 0.018%.

largest predictor of a teachers movement into school leadership.

VII.2 Distribution of School Leadership

In addition to examining the differential movement of teachers into leadership, the third research question in this study set out to identify patterns in the distribution of new leaders as a function of school and instructional quality. Table VII.3 presents the results of modeling school quality (from the new leaders' teaching days) with the various characteristics of the hiring school. Model 5 includes all new leaders; model 6 restricts the sample to only those new leaders who moved into a leadership position in a school different from the school at which they taught. In both model 5 and model 6 the level of analysis is the vacancy of the leadership position.

The most striking conclusion drawn from Table VII.3 is that new leaders who taught in high value-added schools tend to have accepted leadership positions in other high value-added schools (School VA = 0.49). The trend, however, functions in both directions and also suggests that teach-

ers who taught in low value-added schools are more likely to accept a leadership position in a low value-added school. Having taught in a high value-added school does not appear to have any bearing on whether the individual moves into a position as a principal or a vice-principal, nor does it have an appreciable relationship to school achievement or school size. There is, however, a slight positive relationship to school demographics (% White = 0.04), indicating that schools with more white students appear more slightly more likely to attract new leaders from high value-added schools. This coefficient of 0.04, where represents a 0.04 unit increase in school value-added (which is slightly less than 1/2 of a standard deviation), reflects an individual moving from a non-white school to an all white school. As we saw in the descriptive overview (e.g., Figure VII.4), such moves are uncommon.

Table VII.3: School Quality & Leadership Distribution

	(5) All new leaders		(6) New Leaders who switched schools	
	Coef	SE	Coef	SE
School VA	0.49 ***	0.07	0.18 *	0.08
Principal	0.02	0.01	0.00	0.02
% White	0.04†	0.02	0.07 *	0.03
Math Score	0.00	0.02	0.00	0.03
School Size	0.00	0.00	0.00	0.00
Gross Income	-0.01***	0.00	-0.01	0.01
Observations	908		493	

† indicates $p < 0.10$, * indicates $p < 0.05$, ** indicates $p < 0.01$, *** indicates $p < 0.001$

The table above presents the results of an OLS regression model predicting teachers' school-level value-added using characteristics of the school at which they were hired as a school leader. The sample in model 5 includes all teachers with school-level value-added measures from grades 4-8 who moved into a school leadership position; the sample in model 6 restricts the sample from model 5 to those teachers who accepted a leadership position at a school different from the one in which they previously taught.

It is possible that the magnitude and significance of the school value-added coefficient is solely the result of the teachers who stay in the same school. In such cases the school value-added coefficient would be biased towards one. Model 6 excludes these individuals and we see that, although diminished, this coefficient remains appreciably positive and significant.

In the final analysis, I again examine patterns of leadership distribution, this time focusing on the role of instructional quality as measured by teacher value-added. Similar to the prior results, Table VII.4 shows that individuals who demonstrated higher instructional quality are more likely

to move into leadership positions in high value-added schools, albeit at diminished levels of significance (p=0.08). At similar levels of precision, moving directly into a principal position, school math score, and school size all show some positive relationship to instructional quality.

Table VII.4: Instructional Quality & Leadership Distribution

	(7) All new leaders		(8) New leaders who switched schools	
	Coef	SE	Coef	SE
School VA	0.35 †	0.21	-0.04	0.16
Principal	0.07†	0.04	0.05	0.05
% White	-0.06	0.07	-0.05	0.08
Math Score	0.14†	0.08	0.15*	0.07
School Size	0.01†	0.01	0.00	0.01
Income	-0.02	0.01	0.00	0.02
Observations	270		159	

† indicates p $<$ 0.10, * indicates p $<$ 0.05, ** indicates p $<$ 0.01, *** indicates p $<$ 0.001

The table above presents the results of an OLS regression model predicting teachers' individual value-added using characteristics of the school at which they were hired as a school leader. The sample in model 7 includes all teachers with individual value-added measures from grades 4-8 who moved into a school leadership position; the sample in model 8 restricts the sample from model 7 to those teachers who accepted a leadership position at a school different from the one in which they previously taught.

After restricting the sample to those individuals who moved schools as they transitioned to a leadership position it is evident that the school value-added relationship is no longer significant (School VA = -0.04). It then appears that high value-added teachers are likely to move into leadership positions at high value-added schools primarily when they have taught at that school. This reinforces the notion that schools may use local informal information networks to evaluate po-

tential candidates. Schools may have a rich contextual understanding of teachers working within the building; high value-added teachers may then be more likely to be promoted into leadership positions when they can rely on their within-school reputation in addition to their instructional expertise. When moving to other schools for a leadership position, it does appear that the hiring school's math achievement is the only variable that relates to the new leaders' prior instructional quality.

VII.3 Limitations

The results presented in this work are subject to several notable limitations. First, value-added measures are an indirect measure of teacher quality and have been subject to conceptual and methodological criticism. One mechanism that may bias teacher value-added estimates that is relevant to this inquiry pertains to the non-random assignment of teachers to students. If principals favored some teachers over others, allowed these favored teachers to select their students for the following year, and also favored them with additional resources, then we may expect that principals may also be more likely to "tap" these teachers for subsequent leadership positions. Under such conditions, even if all teachers were of equal instructional ability, these teachers would receive higher value-added ratings and would also be more likely to move into school leadership, thus creating a spurious positive relationship between teacher quality and leadership matriculation. Although work by Kane et al. 2010 and Milinowski 2004 suggests that value-added measures are sound proxies for the underlying teacher practices that support their use, such political gamesmanship within schools is not inconceivable.

The second limitation of this study lies in my inability to portray the choice sets of the actors within the labor market. This research depicts individuals moving from a classroom teaching position to a position as an assistant or full school principal. There are two critical selection steps in this process. The first involves individuals selecting into and being selected by administrative certification programs. The second selection step occurs as individuals are selected into and are

selected by schools to fill leadership roles. In the pipeline sample I restricted the comparison group to those teachers with administrative licensure, however Muth, Browne-Ferrigno, Carr, & Fulmer (2004) found that many teachers who enter administrative certification programs have little desire or motivation to become school leaders. Muth et al. (2004) suggest that this issue of lack of commitment to leadership has costs in terms of lost opportunity costs, inefficiencies in the training process, and ends up rewarding teachers for additional knowledge that has little to no bearing on their professional responsibilities. One solution, as the authors point out, is to change administrative certification admissions requirements. By examining both the leadership opportunities that teachers have sought out and the quality with which the opportunities have been performed, programs may be better equipped to identify those individuals legitimately interested in pursuing school leadership. Another solution may be to limit the duration for which administrative masters degrees can contribute to increases in teacher salary schedules. If teachers knew that the financial value of an administrative masters degree came primarily from moving into a leadership position rather than moving up the salary schedule and staying in the classroom we may find those in the leadership labor pool would be more willing to apply for principal and assistant principal positions.

In an attempt to cultivate a ready supply of school leaders, some districts may also provide full or partial subsidization of the coursework required to obtain administrative licensure. There is a potential conflict of interest at play in such policies since some teachers may have no interest in leadership and may be interested in completing such coursework only as a mechanism to move them higher on the salary schedule (Muth et al., 2004). If such individuals differ systematically from other teachers on measures of instructional or school quality, their inclusion would result in biased estimates.

The use of test-based value-added measures presents another limitation. Observational or survey methods may be produce better measures of of instructional and school quality constructs. Student surveys of instructional quality may be more reliable (less noisy) than value-added mea-

sures and carry the additional benefit of being available for all teachers, not only those in tested subjects.

In this particular state districts tend to be fairly large, frequently coinciding with county boundaries. These results, especially those regarding intra-district matriculation, may not readily generalize to states with a larger number of small districts. It would be interesting to see how district size or proximity to schools beyond an individual's district relates to distributional patterns in leadership matriculation.

Having full access to an application database that indicates which candidates applied to which schools coupled with information on which schools extended offers to which candidates would address many of these concerns. Collecting such information represents a next step in this line of research.

CHAPTER VIII

DISCUSSION

This study has been motivated by a need to better understand the labor supply of school leaders. School quality, typically a measure of institutional or leadership quality, has been recast as a measure of teacher quality, emphasizing the elements of school quality that may translate into organizational effectiveness. I have argued that instructional quality may be a telling predictor of subsequent leadership behaviors, namely those leadership behaviors associated with learning-centered leadership. Empirically, this research set out to address three questions on the subject of school leadership matriculation:

1. To what extent is school quality related to a teacher's movement into a leadership position?
2. To what extent is instructional quality related to a teacher's movement into a leadership position?
3. Do highly effective teachers, or teachers from highly effective schools, tend to move to leadership positions in high status schools, or do these teachers move to schools most in need?

To the first and second question I have shown that among all teachers, school and individual value-added were positively associated with leadership matriculation, yet among teachers with administrative licenses school and individual value-added show no significant relationship to leadership matriculation. Speaking to the third question I have shown that school value-added as a teacher is positively related to the value-added of the school hiring a new leader. This trend appears to be less pronounced for individual value-added where high value-added teachers are most likely to be hired as new leaders in high-achieving (rather than high growth) schools.

The findings above suggest that it is teachers from higher value-added schools, not higher achieving schools, that are more likely to move into positions of school leadership. Assuming that exposure to organizational effectiveness is a desirable attribute in new leaders, this appears to be a positive finding. Although we cannot be certain from this research how such exposure translates into subsequent leadership behaviors, it is difficult to reason how experience in a highly effective context would be detrimental to leadership development.

A recent study has shown that many current principals, when still teaching, were identified and helped into leadership roles by their own principals (Myung, Loeb, & Horng, 2011). Coupled with other research that provides evidence that principals can ably identify the top decile of effective teachers in their school (Jacob & Lefgren, 2008), the findings presented here may be a result of principals identifying more effective teachers and supporting them in a move towards formal leadership positions. Indeed, such a phenomenon would explain why it appears that highly effective teachers are more likely to obtain leadership licenses. This potential behavior also provides an additional and interesting hypothesis in favor of further examination of school quality prior to leadership matriculation: Working in a highly effective school may also mean that an individual was identified for leadership by the leader of a highly effective school. It may be that highly effective leaders are better equipped to identify individuals with strong leadership potential; the homosocial tapping phenomenon that Myung et al. (2011) suggest lends credence to this hypothesis.

This research has shown that more effective teachers are more likely to hold an administrative license, yet among administratively licensed teachers they are no more likely to move into a leadership position. In light of the preceding overview of existing selection trends in administrative certification programs, one may infer that more effective teachers are more likely to apply to administrative certification programs than are their less effective colleagues. From an organizational perspective, it is unclear at this point whether or not this is a desirable outcome. If subsequent research finds that instructional effectiveness is predictive of instructional leadership then we must

consider a cost-benefit framework to identify the balance between the relative contributions of the individual functioning as an effective teacher as opposed to an effective school leader. If subsequent research finds that instructional effectiveness is not predictive of instructional leadership then the findings presented here appear to highlight an inefficiency in the system. And yet, should the counter-factual for an effective teacher turn out to be an exodus from education as they accept a position in another field as opposed to remaining in the classroom, a leadership promotion may still be in the best interests of the district.

Given the controversy around the use of value-added assessment for organizational and personnel decisions (e.g., Thrupp (2001)), it is of considerable interest if value-added measures are related to movement from teaching into leadership. This research has provided evidence to suggest that those who enter the leadership applicant pool – those who currently hold administrative licenses – are primarily those who demonstrated superior instructional quality or those who came from highly effective schools. This research has also shown that there is little reason to suppose that the schools or districts hiring new leaders are privileging instructional or school quality in their hiring decisions. While this may represent wisdom on the part of districts if prior quality is unrelated to subsequent leadership ability, it may also represent an oversight and a potential policy lever to improve the pool of effective school leaders. An inquiry into such possibilities represents a rich area for future research.

As has been illustrated with this research, I argue that we should move from "quantity" criteria to "quality" criteria in leadership hiring decisions. Quantity criteria, which are currently being used primarily because they have been used in the past and are readily available, include elements such as college degree, years of teaching experience, having been a coach, sponsoring an extracurricular activity, serving as department head, and leading professional development sessions (**?**). This research has examined one of the above elements, a teacher's teaching experience, and has sought to move from a quantity measure of "how long has one taught" to "how well has

one taught." This research has used value-added measures of student achievement as a potential predictor of instructional leadership and organizational effectiveness, yet other measures may be worthy of consideration. These measures may include measures such as parent surveys, student surveys of teacher instructional practices, teacher and student climate surveys, and National Board Certification.

With student, parent, and teacher surveys readily deployed, collected, and stored electronically, the financial cost to districts to initiate and maintain such surveys is small. The costs are still less when we consider that such surveys or other evaluative measures can be useful for improving, not only leadership selection, but the human resource management of schools as a whole, primarily from a teacher or principal evaluation/development standpoint (Odden, 2011). Such a database could be used not only to better discern amongst applicants, but also to seek out and actively recruit potential candidates.

The distributional inquiry was motivated by a concern over the equitable distribution of leadership quality. From an equity stand point, the most detrimental result would be to find that potentially high-quality new leaders are moving into high achieving, high value-added schools. Such a result would represent social-cultural reproduction (Bourdieu, 1973) operating at the institutional level. This movement would consolidate organizational knowledge into schools serving privileged students and likely serve as a mechanism to exacerbate gaps in student achievement. The final analyses (Table VII.4) presented evidence to suggest that new leaders with superior instructional skills may be moving disproportionately into high-achieving schools, especially when new leaders switch schools (model 8). Results examining school quality (Table VII.3) provide evidence that potentially high-quality new leaders move into high academic growth schools. The end product is a partial consolidation of capabilities into high-growth schools. This influx of potentially high-quality new leaders may indeed be part of the story behind the success of low-achieving and high-growth schools. Unfortunately, this finding is rather disparaging for low-achieving, low-

growth schools who have few resources at their disposal to attract highly effective leaders.

Other research on teacher and principal mobility has established trends showing movement away from high-minority and low-achieving schools and towards low-minority and higher-achieving schools. Beyond student demographics and achievement,Loeb et al. (2005) found that the most significant predictor of teacher turn-over pertained to school conditions. To the extent that school conditions are positively correlated with school value-added, the analyses on the distribution of new leaders show a similar trend where teachers from high value-added schools are likely to go to schools with more white students, yet the stronger trend to move into a high value-added school (see VII.3). Similarly, teacher quality appears to be related to both school achievement as well as school growth (see VII.4).

Some scholars have noted the narrowly local, even provincial, nature of educational labor markets (Boyd et al., 2005; Lortie, 2009) and the results presented here suggest that new leadership labor markets function in a similar manner. As presented above, 80% of new leaders take positions in schools within the same district in which they taught. Lortie interprets such trends as being indicative of a district preference for leaders with a knowledge of local context 2009. Given the preceding perspective on the existing structure of leadership selection, it is possible that these selection policies have induced an artificially strong tendency for within district selection.

Informal, non-systematic information regarding new leaders is likely to be most reliable within their immediate professional vicinity – their district. That is, it is primarily within districts that teachers can develop their reputation as potential school leaders. Through word of mouth or personal interactions local school and district leaders can gage some of the quality measures identified above. These informal networks may help distinguish between intra-district candidates who are legitimately interested in leadership to improve student outcomes as opposed to less desirable candidates. Because informal information on candidates without leadership experience tends to be

concentrated within districts and the selection process into leadership is often non-discriminant, districts may become overly reliant on within district candidates. If it is known among the labor supply that institutions primarily hire from within, new leadership candidates will be less likely to apply to positions beyond their own district. Thus, integrating more information into the administrative certification selection process may help schools attract intra-district candidates and may also assist schools in selecting among candidates.

Murphy characterizes administrative certification selection policies as propagating a leadership labor pool where "automorphism reigns, "good old boys" flourish, and "savvy, risk-taking, entrepreneurial educational leaders" are conspicuous by their absence 1992, p. 84. Similarly, Myung et al. (2011) found evidence of homosocial tapping behaviors among Miami-Dade principals. Such behaviors are revealing yet unsurprising – without any alternatives, it is reasonable for leaders to seek out teachers who reinforce the leaders' vision of their own competencies. Principals have more contextual knowledge of their teachers than can be summarized on any survey and should be a valued part of the recruitment and nomination portion of the leadership supply chain. Rather than leaving principals to identify potential candidates at their convenience, districts should consider training principals to identify teachers who have consistently demonstrated leadership potential. Districts can take advantage of a principals' deep local knowledge to identify and recruit candidates not only by what they have done, but by how well they have done it. Formalizing such an identification process, perhaps through the use of the measures suggested above, could be a notable step to address concerns regarding principal pipeline.

By instituting more comprehensive selection policies an measures a more robust set of potential indicators including parent, principal, peer, and student surveys, letters of recommendation, classroom observations, tests (e.g., GRE, PRAXIS and Gallop PrincipalInsight), writing samples, years of experience, and education can be included in the selection criteria. This comprehensive recruitment and selection process may produce a more capable leadership labor supply.

The strong propensity of leadership hires to be made within districts may offer an opportunity to change these leadership patterns in low-achieving low-growth schools. A labor demand perspective would suggest that the geographically limited hiring patterns may be attributable to districts and schools placing a premium on localized knowledge and experience. A labor supply perspective may suggest that this same phenomenon may be attributable to individuals being socially and professionally vested in their local community and preferring this known context over others. Both views would be congruous with a policy to develop partnerships between high-growth and low-growth schools within districts. In addition to the clear benefits of networking and sharing of ideas, such pairings may familiarize potential leaders with the low-growth schools and increase the probability that they would consider leadership positions at these or similar schools.

Higher salaries and signing bonuses represent second policy lever to attract new leaders to low-growth, low-income schools. Considering that the demands of school leadership have been increasing and teacher salaries have been rising faster than those of administrator salaries, we may expect a portion of the leadership pipeline issues to stem from diminished incentives to move into school leadership. As shown in Tables VII.1 and VII.2, when teachers' income rises they are less likely to move into a leadership position. We may then infer that financial compensation is partially driving movement into leadership. If working conditions are considered to be a part of the overall compensation for moves made within the education sector (Loeb et al., 2005), districts may want to consider methods to increase financial compensation for leaders in schools where alternative forms of compensation are lacking. The results presented here suggest that new leaders may be receptive to such policies.

The framework motivating this study is empirical in regard to its reliance on established research on high-quality instruction, leadership behaviors, and organizational effectiveness; however the validity of the claim linking teacher quality to leadership effectiveness remains unsubstantiated.

Although testing the validity of the framework is beyond the scope of this particular research, such an inquiry is central to the larger research agenda framing this work. Many of the interpretations and policy suggestions that may be drawn from this research are conditional on the validity of the proposed framework. For example, if later research can determine that instructional quality is not related to leadership efficacy, we may want to consider policy levers to keep high value-added teachers in the classroom. If later research finds that instructional quality is predictive of leadership efficacy we need to compare the relative effects of the outcomes before taking steps to promote one over the other. The validation of this framework will be of substantial interest to research related to leadership preparation and effectiveness as well as being of notable interest to policy makers.

CHAPTER IX

APPENDIX

Table IX.1: Descriptive Statistics

	Min	**Max**	**Mean**	**S.D.**
Teacher VA	-1.223	1.479	0.004	0.245
School VA	-1.367	0.967	0.013	0.137
School % White	0.000	1.000	0.685	0.335
School Math Achievement	-2.700	4.252	-0.003	0.418
Teacher Gender			0.161	0.367
School % ELL	0.000	1.000	0.820	0.285
School Enrollment	0.100	12.590	2.965	2.463
Experience Quintile 1			0.204	0.403
Experience Quintile 2			0.200	0.400
Experience Quintile 3			0.207	0.405
Experience Quintile 4			0.199	0.399
Experience Quintile 5			0.191	0.393
Gross Income	2.155	15.550	4.412	0.855

Note: School size is measured per 100 students. Gross income is measured per $10,000.

Table IX.2: Cross-correlation table

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Teacher VA	1.00												
School VA	0.46	1.00											
School % White	0.18	0.11	1.00										
School Math Achievement	0.48	0.61	0.53	1.00									
Teacher Gender	-0.05	-0.09	-0.01	-0.04	1.00								
School % ELL	-0.08	-0.11	0.07	-0.14	-0.02	1.00							
School Enrollment	0.01	-0.09	0.01	0.14	0.15	0.01	1.00						
Experience Quintile 1	-0.06	-0.01	-0.03	-0.04	0.05	-0.00	0.00	1.00					
Experience Quintile 2	-0.02	-0.01	-0.01	-0.02	0.01	-0.00	0.00	-0.25	1.00				
Experience Quintile 3	0.02	0.00	-0.00	0.00	-0.01	0.00	-0.01	-0.26	-0.26	1.00			
Experience Quintile 4	0.03	0.01	0.03	0.03	-0.02	-0.00	-0.00	-0.25	-0.25	-0.25	1.00		
Experience Quintile 5	0.03	0.01	0.01	0.02	-0.03	0.01	0.00	-0.25	-0.24	-0.25	-0.24	1.00	
Gross Income	0.04	0.02	-0.32	-0.03	0.00	-0.06	0.05	-0.54	-0.28	0.02	0.24	0.57	1.00

Table IX.3: Comparison among teachers with and without Administrative Licenses

		Teacher VA	School VA	School % White	School Math Achievement	Teacher Gender	School % ELL
Without Licenses	Min	-1.22	-1.37	0.00	-2.70	0.00	0.00
	Max	1.48	0.97	1.00	4.25	1.00	1.00
	Mean	0.00	0.01	0.69	-0.00	0.16	0.82
	S.D.	0.25	0.14	0.33	0.42	0.37	0.29
With Licenses	Min	-0.90	-1.37	0.00	-2.21	0.00	0.00
	Max	0.88	0.97	1.00	4.25	1.00	1.00
	Mean	0.02	0.00	0.67	-0.04	0.24	0.84
	S.D.	0.26	0.14	0.35	0.42	0.43	0.27

		School Enrollment	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Gross Income
Without Licenses	Min	0.01	0.00	0.00	0.00	0.00	0.00	2.16
	Max	12.59	1.00	1.00	1.00	1.00	1.00	15.55
	Mean	2.96	0.21	0.20	0.21	0.20	0.18	4.40
	S.D.	2.46	0.41	0.40	0.41	0.40	0.39	0.85
With Licenses	Min	0.01	0.00	0.00	0.00	0.00	0.00	2.97
	Max	12.04	1.00	1.00	1.00	1.00	1.00	8.77
	Mean	3.16	0.03	0.08	0.09	0.24	0.56	5.06
	S.D.	2.57	0.18	0.27	0.28	0.43	0.50	0.87

Note: Exp 1-5 refer to the five within-district experience quintiles. School size is measured per 100 students. Gross income is measured per $10,000.

Table IX.4: Instructional Quality & Leadership Matriculation:Robustness Checks

		(3) All Teachers		(9) 2 year MA		(10) 3 year MA		(11) 2 year lag	
		Coef	SE	Coef	SE	Coef	SE	Coef	SE
Teacher VA		0.34**	0.10	0.40**	0.15	0.39+	0.21	0.28*	0.14
School VA		0.26	0.29	-0.06	0.38	-0.3	0.51	-0.02	0.38
% White		0.01	0.15	-0.01	0.17	0.05	0.23	0.02	0.18
% Non-ESL		-0.24	0.12	-0.25†	0.13	-0.30*	0.15	-0.23	0.15
Math Achievement		-0.24*	0.11	-0.11	0.13	-0.05	0.16	-0.23	0.14
Teacher Gender (male)		0.56***	0.06	0.51***	0.07	0.44***	0.09	0.54***	0.07
School Size		0.015	0.01	0.01	0.01	0.01	0.02	0	0.01
	2	0.25***	0.07	0.20*	0.09	0.1	0.13	0.33***	0.09
Experience	3	0.47***	0.09	0.42***	0.11	0.31*	0.15	0.57***	0.12
Quintile	4	0.77***	0.11	0.79***	0.13	0.77***	0.17	0.89***	0.14
	5	0.96***	0.14	0.98***	0.16	0.93***	0.2	1.09***	0.17
Income		-0.32***	0.07	-0.37***	0.09	-0.39***	0.1	-0.32***	0.09
Observations		41,201		28,079		18,760		22,929	

† indicates $p < 0.10$, * indicates $p < 0.05$, ** indicates $p < 0.01$, *** indicates $p < 0.001$

The table above presents the results of a probit regression model predicting teachers' matriculation into school leadership. The sample for models 3, 9-11 include all teachers value-added measures yet differ on how how the measure was constructed. Model 3 has no moving average (as presented in Table VII.2 for comparison); Model 9 uses a 2-year moving average; Model 10 uses a 3-year moving average; and Model 11 uses a value-added model that includes a two-year lag in student test score and may be robust to student-teacher sorting biases. Coefficients are marginal probabilities.

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