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Implicit Performance Awards:
An Empirical Analysis of the Labor Market for Public School Administrators

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1. Introduction

Monitoring and incentives are at the heart of any potential solution to an agency problem. Recent efforts to improve public school education in the United States have devoted considerable attention to monitoring – developing standards, implementing tests, and quantifying student and campus performance. In this paper, we examine incentives, with a focus on public school principals. We argue that principals are crucial agents in the production of public school education. Much as a CEO managing a firm acts as an agent under the direction of shareholders, a principal performs managerial responsibilities and provides instructional leadership for his or her campus on behalf of the school board (and the citizenry at large). Providing appropriate incentives for public school principals to engage in (costly) effort, thus, may be critical to improving public schools.

In particular, this paper investigates the extent to which the labor market for school principals may act as a mechanism for providing such incentives. Lemieux and McLeod (2007) find evidence that an increasing fraction of U.S. jobs explicitly pay workers for their performance, arguing that the availability of better information about employees' quality and effort may have enabled this trend. While public schools (in the face of considerable resistance in some cases) have only recently begun implementing performance-based pay, there is considerable potential for employment mobility across campuses, substantial salary heterogeneity among schools, and opportunities for promotion to district-level administrative positions. As such, principals may be able to significantly increase their lifetime earnings based on the performance of the schools they manage. Indeed, the performance monitoring done through student achievement testing may generate the information needed to reward principals' effort through the labor market. Our analysis will explore the role of career concerns in the context of public school education – how school districts use data on campus achievement in hiring, promotion and salary setting, and how administrators may respond to the incentives provided by the internal and external labor markets. Since the extent of available monitoring data, and experience with using it to evaluate performance, has been increasing over time, we can ascertain whether there has been an associated change in the labor market response.

Empirically, we study the effects of a school's performance on the mobility and career advancement opportunities of its administrative leader.[1] We exploit a unique dataset, assembled

[1] Bertrand and Schoar (2003) is a good example of an analogous study in the CEO literature. Billger (2007) tackles

from all public schools in the state of Texas from 1989 through 2006. The dataset combines the "monitoring" information – detailed campus-level scores from state-administered standardized tests – and the "incentives" information – the complete employment and wage histories of all school principals during this period. With this information, we can investigate the connection between the measured performance of a principal's campus and the future employment status, occupational role, and salary of the principal. Our data on Texas public school administrators are ideal for such an application for several reasons: (1) we have a complete panel with a large number of hiring organizations; (2) turnover and promotion happen almost exclusively within the schools and districts in our sample; (3) there is considerable variation in the size of schools and the organizational structure of school districts; (4) wage data are included and represent the bulk of employee compensation (e.g., no stock options to consider); and (5) school test scores provide a universal metric on which the performance of employees in the dataset can be evaluated.

Thus, our analysis contributes to two previously distinct literatures. The first is the empirical personnel economics literature, which has recently begun to exploit matched employer-employee datasets to test various theories about careers in organizations and the relationship between internal and external labor markets.[2] The attractive features of our data present the opportunity to draw more comprehensive conclusions about the interaction between organizational structure and both internal and external labor markets. For example, by connecting the performance of individual principals with their subsequent salary and employment status, we can more directly distinguish the causes and consequences of job mobility, a la Gibbons and Katz (1991). Prior empirical studies in this literature have tended to focus on evaluating a specific theoretical implication, owing to datasets that were strong on only one or two of these dimensions. Prominent among these include papers on CEO and upper-level management turnover (e.g., Weisbach, 1988; Hayes, Oyer and Schaefer, 2006), career concerns of mutual fund managers (e.g., Chevalier and Ellison, 1999), and promotion and turnover among bank managers (e.g., Blackwell, Brickley and Weisbach, 1994).

The paper also complements the education literature on the impact of accountability and

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a similar question for principals using cross-sectional data, and an earlier study by Ehrenberg at al. (1988) adopts a similar approach to analyze career paths of superintendents.

[2] Surveys of the relevant theories in these areas include, for example, Gibbons and Waldman (1999) and Lazear and Oyer (2004).

performance evaluation programs in public schools. In particular, a stream of this literature (e.g., Jacob and Levitt, 2003; Jacob, 2005; Cullen and Reback, 2006; Chakrabarti, 2006) demonstrates that these performance measures are often manipulated in a variety of ways (some subtle, some not). Microeconomic foundations for this sort of gaming behavior may be found by exploring the relationship between school performance and rewards received by individuals employed by schools. As mentioned above, we posit the agency relationship as between the school district (representing the public) as the principal and the school's administrator (not the "school" itself) as the agent. A campus principal may engage in costly effort to improve the performance of his or her school; our analysis documents the return to providing that effort in terms of future wage and employment outcomes.

2. Background: campus principals and the principal labor market in Texas

Our focus in this paper is on principals as campus leaders, the key agent responsible for mobilizing staff and resources within schools to perform educational activities and to meet relevant performance standards. Success for an administrator depends on the ability to manage a broad set of activities, including instruction, personnel, budget and community relations. Over the past two decades, the emphasis on principals as providing instructional leadership has increased.[3] Several broad surveys of the profession (e.g., Fiore and Curtin, 1997) and Gates et al., 2003) characterize the demographics and responsibilities of principals. There is also heightened attention on the principal position based on concern about a potential leadership vacuum created by the exodus and impending retirements of principals, particularly in urban school districts (Hopkins, 2006).

A small but growing education literature is documenting how principals can affect campus performance. By making curriculum choices (Eberts and Stone, 1988), assessing teacher quality (Jacob and Lefgren, 2005) and making effective hiring choices (Brewer, 1993), principals' management efforts may yield greater student achievement.[4] It is difficult to quantify the link between a principal's efforts and school performance in a cross-sectional study, however, as

[3] An alternative perspective considers campus leadership as distributed among various individual school employees (see, for example, Spillane (2005)). Our detailed data on complete staffing within campuses may allow us to tease out the effect of leadership teams on outcomes in future work.

[4] Hallinger and Heck (1996) review the literature studying the role of the principal in school effectiveness.

there is little basis on which to separate the effect of a school's principal from other unobserved campus-level factors that could influence outcomes. Recent studies (e.g., Coelli et al., 2006; Lavy, 2007) exploit exogeneity from principal assignment experiments to help isolate a principal's ability. Our analysis utilizes a long time-series of annual observations – over the period of study many principals lead more than one campus and most schools have had multiple principals – that may permit us to separately identify a campus fixed effect and a principal quality measure. We proceed to explore whether the principals' contributions as measured in this manner affects employment prospects and future campus performance.

On several dimensions, the institutional features of the public school system in the state of Texas presents an ideal context to study the labor market for principals. Within the state, there are over 1,000 local school boards that have governance authority over their local jurisdictions.[5] Individual school boards hire district superintendents, who in turn hire campus principals that are responsible for assigning teacher and other instructional positions. It is worth noting that Texas is one of only two states that expressly prohibit collective bargaining by public school teachers. This gives principals additional scope to affect campus performance through staffing than may be possible in places where teachers have more negotiating power.[6] It also exposes campus administrators to the same employment risks – indeed, until 2003 Texas schools were required to offer new principals short-term contracts. Although the state mandates the minimum base salary that districts must pay teachers according to years of experience, there are no such restrictions for administrative positions. So, while teacher pay is partially determined by non-market forces,[7] there is substantial scope for districts to reward sought-after principals and superintendents.

Principals in Texas arise from the teacher pool; this is natural given that principals are required to have completed two years of successful classroom teaching, as well as to have

[5] Information on Texas school districts and governance comes from the ECS (Education Commission of the States) State Notes, on line at http://www.ecs.org/ecsmain.asp?page=/html/publications/home_publications.asp.

[6] According to the Association of Texas Profession Educators publication "Texas Public School Employee Contracts," teacher contracts in Texas differ from district to district, and teachers may be reassigned to any position that fits within their professional capacity (e.g., another grade level he/she is certified to teach) as stated in the contract. Many teachers in Texas are employed under either probationary or term contracts, which allows teachers to be fired more easily than in typical in other states.

[7] Despite the fact that the state regulations impose some standardization, pay practices vary widely across districts even for teachers, with some offering higher starting salaries for new teachers, advanced degrees, and high attendance (Clark and Toenjes, 1997). Only a small fraction of campuses have implemented performance pay for teachers.

completed an approved certification program for principals and a Master's degree (19 TAC Chapter 241). The transition from teacher to principal is typically not direct – our initial analysis of the raw data indicates that 65 percent of those who become principals had been assistant principals first, and an additional 19 percent previously held some other campus-level administrative position. After leaving teaching, we find that those who ultimately ascend to be principals typically spend an average of 3.3 years in these positions before becoming principals. While many (particularly those over the age of 55) ultimately transition from jobs as principals into retirement and some return to teaching, a substantial share (30 percent within the first 10 years after becoming a principal) move into district-level support and administrative roles. As we will see in the empirical analysis, the scope for salary increases will be substantial within any school district, as individuals leave teaching to become assistant principals and principals, and then potentially ascend further through the administrative ranks.[8]

While we do observe districts that promote exclusively from within, the career path of administrators involves changes in campuses and districts for most individuals. In our sample, more than 63 percent of the principals have changed campuses and 40 percent have changed districts before they first become a principal. After becoming a principal, about one-third of individuals change districts within ten years. In total, among the principals in our dataset, more than 85 percent change campuses or districts at some time in their career (often multiple times). There are some differences in district and campus mobility across locations – for example, individuals in more urbanized areas are most likely to change campuses within districts and those in rural areas are most likely to transition through multiple districts (though this could be a direct consequence of district size). There are also interesting patterns of administrator movement within and across regions defined by urbanicity. While the most urban principals tend to remain working in highly populated areas if they change jobs, there is a good deal of transitions from all size communities into the most rural school districts. It has been documented (Gates et al., 2003) that the geographic scope of administrative labor markets very rarely goes beyond state borders; we will be able to examine the potential importance of within-state geography for our Texas principals.

[8] A recent paper by Heutel (2006) attempts to evaluate whether a tournament-type model is useful for characterizing within-district mobility opportunities using data from district pay scales and information on the number of administrative positions by district. In future work, we plan to evaluate vary aspects of tournament theory using within-district changes in employment roles over time.

Among the criteria employed to evaluate principals, the Texas Education Code (Subchapter BB, 150.1021) recommends the use of the campus performance objectives underlying campus ratings. In support of this recommendation, legislation was passed in 1995 to provide explicit financials awards to principals based on campus performance – though this program was quickly amended to require that the awards be distributed to the schools instead. Nonetheless, the wide availability of campus-level student achievement information in Texas provides districts the opportunity to incorporate performance data into the evaluation process for hiring, retention and salary decisions.[9] As described more fully in the next section, Texas began administering standardized tests to its public school students in the 1980s. The state first instituted a school accountability system in 1994, under which campuses are assigned to ratings categories based on student achievement and attainment levels. Since then, the system has been continually refined and more comprehensive performance indicators have been added. The most dramatic reform took place in 2003 with the introduction of new curriculum-aligned standardized tests. Combining these comprehensive performance data with the substantial flexibility in employment relationships and mobility of administrators allow us to explore the extent to which successful principals are rewarded by better salaries and better positions, if not explicit state-sanctioned bonus payments.

3. Data

A. Data and variables description and manipulation

We use two primary data sources. The first is the Public Education Information Management System (PEIMS). These data are available for the fiscal years 1989 through 2006, and were provided to us by the Texas Education Agency (TEA). We requested information about all individuals employed by the Texas public school system in teaching, support, and administrative roles. Importantly, a person-specific identifier allows us to track individuals across years and as they move across campuses and districts. These data include person-specific information such as gender, ethnicity, date of birth, educational degree, current position and base pay, as well as

[9] We have found evidence that some districts do this quite explicitly. For example, the Galena Park Independent School District has a policy of removing principals if their school has not reached "recognized" status within three years of assuming the position. The bottom and top of the district compensation range for principals vary by 50 percent; performance data are used to help determine salaries within that range. Several districts specifically request evidence of campus performance on achievement tests in job postings for open administrative positions.

campus and district identifiers. Table A-1 lists the roles for which we have data and a brief corresponding job description. Table A-2 describes the raw data, in terms of the number of individuals in each role and the average annual salary for each year in the dataset. Table 1 presents a summary of the raw wage data by occupational role, combining each year's salary information converted to 2006 dollars. While we can think of positions moving down the table as "promotions," in terms of generally increasing wage distributions, there is considerable variation in salaries within all the occupational roles. As such, it is crucial that we are able to track careers of individuals and match their specific wage and occupational roles over time.

The second data source is the Academic Excellence Indicator System (AEIS).[10] These data are collected annually and provide detailed campus-level information on student demographics, student performance, and staffing, as well as campus- and district-level financial information. We currently have compiled the available campus-level testing information for the years 1989 through 2006 (though the data for the 1989-91 period – prior to school accountability – are limited on some important dimensions). Most of the demographic, staffing and financial variables are self-explanatory and used as given, other than the financial variables which are converted to constant 2006 dollars using the CPI for all urban goods. We were able to check the staffing data from AEIS against the PEIMS personnel data to confirm the internal consistency of the two information sources.

The variables that require more explanation are the performance measures. Texas has a long history of offering statewide standardized examinations to its public school students, starting with the Texas Educational Achievement Monitoring System (TEAMS) that was administered through 1990. The state transitioned to the Texas Assessment of Academic Skills (TAAS), which was administered statewide every Spring over the period 1991 through 2002. Students were tested in reading and mathematics in grades 3-8 and 10, and in writing in grades 4, 8 and 10. Spanish exams for grades 3-6 were phased in starting in 1997, and a special assessment for special education students was introduced in 2001. The Texas Assessment of Knowledge Skills (TAKS) replaced the TAAS in 2003. These more comprehensive curriculum-based exams include reading (or language arts) and mathematics exams in grades 3-11, as well as writing, science, and social studies exams for subsets of these grades.

Using the various reported test scores in each cross-section, we created a summary measure

[10] These data are available for download on the TEA website located at http://www.tea.state.tx.us/perfreport/aeis/.

of student achievement defined as consistently as possible across years. We averaged the campus-level pass rates on reading and mathematics, which themselves are averaged across all tested grades. The passing standards for the TAAS remained constant across years, but were phased-in for the TAKS. For the TAKS, we use the pass rates relative to the fully phased-in standards for all years. The pass rates are based on the accountability subset in each year. This subset excludes students exempted for a variety of reasons (e.g., moved to the district mid-year, limited English proficient, special education), and increases in coverage over the period due to reductions in the types of allowable exemptions. To minimize the role of secular changes in measurement, we define the campus "achievement level" to be the mean pass rate, standardized to have a zero mean and a unit standard deviation in a student-weighted distribution.

As one way to characterize the underlying potential of individual campuses, we also calculated a "predicted achievement level" measure. We ran initial regressions of the average pass rate on student demographic and district financial variables, separately by year.[11] We then used the estimated coefficients to predict the pass rate at each campus, and standardized the prediction to have a zero mean and a unit standard deviation in a student-weighted distribution. A value of zero indicates that the campus characteristics are such that its students are predicted to perform at the same level as the campus attended by the average student. Campuses with positive (negative) values have attributes that predict higher (lower) aggregate achievement.

The same regressions were used to calculate a crude "productivity" measure specific to each campus and year. Here, we extracted the residuals, and standardized them in the same way. A value of zero indicates the campus is performing just as expected given its context. A positive value implies the campus is performing better than expected, and a negative value is consistent with underperformance. We will examine whether such a measure of performance that is conditional on expectations has an independent effect on labor market outcomes, beyond the raw performance results and the more public accountability measures.

In 1994, Texas began its campus accountability program, in which every school is given a discrete rating based on its past year's performance. The test pass rates are key determinants of

[11] The campus-level student variables included are: grade distribution, race/ethnicity distribution, fraction economically disadvantaged, fraction moving to the campus mid-year, fraction included in the accountability subset, logarithm of enrollment. The district-level variables included are: logarithm of enrollment, logarithm of per pupil property value, and fraction of property wealth that is residential, as well as indicators for each of the 20 Education Service Center regions. The regressions are ordinary least-squares regressions and are weighted by campus enrollment.

the rating that each campus receives, along with dropout and attendance rates. Campuses are designated as Exemplary, Recognized, Acceptable, or Low Performing depending on how performance relates to the standards in place in each year. Campuses receiving higher ratings are eligible for various awards and freed from some regulations, while Low Performing campuses are subject to successively invasive interventions. Previous research (e.g. Cullen and Reback (2006)) suggests that these discrete accountability measures are targeted by schools in an effort to improve their observed "performance."

B. Market analysis – campus accountability and principal turnover

For this subsection, we report data that span the years 1994 through 2006, beginning with the first year in which the Texas campus accountability system was in place. For this campus-level analysis, we start with the AEIS sample of all campuses serving students in the years 1994 through 2006, and match these to principals from the PEIMS. We then exclude alternative education campuses, such as juvenile detention, residential treatment, and early education centers. These campuses are either not subject to the standard accountability system or do not serve students in tested grades. We drop an additional 13.6 percent of regular campuses that never or rarely report having a full-time principal, share duties across equally multiple principals, or do not appear in consecutive years in the AEIS. There are a total of 6,254 regular campuses represented in the analysis sample across the years, and the typical campus is represented in the sample for 11.4 of the 13 years.

Table 2 shows the number of campuses in each year and the share in each year that experiences principal turnover. On average, there are about 5,500 campuses per year, with the number increasing over time as new campuses are opened. The turnover rate is forward-looking, and represents the fraction of schools that do not have the same principal in the following year. Turnover is substantial over the sample period, with nearly one in five schools hiring a new principal each year. There is limited year-by-year variation, but turnover is slightly higher in the second half of the period than the first.

Table 3 breaks down average turnover according to a few salient campus characteristics. In terms of students served, the turnover rate is lowest (16.7 percent) for elementary school campuses, higher (20.4 percent) for middle schools and highest (22.7 percent) for high schools. Campus ratings and performance on standardized exams also appear to be quite important.

Campuses rated in successively lower categories have correspondingly higher turnover, peaking at 32.1 percent of campuses rated in the Low Performing category for a given year. The relationship seems to be moderated by our "productivity" measure. For example, among Low Performing and Acceptable campuses, those that also performed poorly relative to similarly situated schools turned over their principals even more often (.329 vs. .272 and .210 vs. .181). The reverse pattern holds for Exemplary schools, in that higher productivity is associated with higher turnover (.161 vs. .148). These differences may reflect push vs. pull factors underlying turnover that we will be able to explore more closely by looking at the careers of individual principals.

These raw percentages are confirmed in the campus-level principal turnover regression results reported in the first three columns of Table 4. In each of the three listed specifications, we ran a probit whose dependent variable was one if the campus had a new principal in the following year. In addition to the campus-level performance measures listed in the table, we control for a detailed set of campus and district level control variables (described in the notes to the Table), along with region and year fixed effects. According to the results in column 1, as compared to campuses rated as Exemplary, Recognized schools were 1.6 percentage points more likely to change principals the following year. Acceptable schools were 4.2 percentage points more likely, and Low Performing schools were 16.3 percentage points more likely. Column 2 shows that schools that scored lower on achievement tests than otherwise similar schools were more likely to change principals in the following year. A one standard deviation fall in the pass rate is associated with an increase in turnover of 3.4 percentage points. Controlling for both ratings and achievement levels at the same time (column 3) mitigates the independent role of ratings, as expected.

The final columns in Tables 2 through 4 provide complementary statistics on salaries. Consistent with the other occupational roles reported in Table 1, Table 2 indicates that principal salaries are relatively widely dispersed. The median salary is 1.22 times the salary at the 10^{th} percentile, and the salary at the 90^{th} percentile is the same multiple of the median salary. The 90-10 ratio is relatively stable (around 1.5) across years. Although median salaries do not vary dramatically by our campus classifications, Table 3 shows that median salary increases with the grade level of the school and has a U-shaped relationship with ratings level. Within ratings categories, median salary is higher among more productive than among less productive schools,

except for campuses in the highest ratings category. The regression results for log base salary in Table 4 uncover patterns that are more consistent across campus performance groups. That is, conditional on campus characteristics, pay declines steadily with ratings category and increases with campus pass rates. In results from specifications not shown, the wage gradient with respect to productivity is steepest for Exemplary campuses and declines to be near-zero for Low Performing campuses.

4. Empirical analysis – the principal labor market

The results in this section focus on describing the various aspects of the labor market experience of school principals. As described above, the dataset for analysis contains only those individuals who ever were (full-time) principals (at regular campuses) from 1994 through 2006. This leaves us with 14,723 individuals whose careers we track over the sample period. We include all years for all of these individuals' "spells" as principals at various campuses, as well as their positions before and after being employed as a principal where applicable.

We start with the top panel of Table 4, which provides details on the job transitions from one year to the next for individuals who were full-time campus principals in the years 1994 through 2005 (we do not yet know what those individuals who are principals in 2006 will be doing the following year). The top panel of the table indicates that nearly 78 percent of campus principals stay at the same position the next year – or about 22 percent switch jobs from one year to the next. In terms of the roles taken by principals who leave their current position, about 7.5 percent become principals at different schools, 5.2 percent at different campuses within the same district and 2.3 percent at campuses in different districts. About four percent are promoted to district-level positions (just over one-third of these are to administrative positions like superintendent or assistant superintendent) and a slightly lower percentage take positions that are subordinate to another principal, typically as a teacher or an assistant principal. The final category includes those individuals who do not appear at all in the data the following year. We suspect that many of these may be transitions into retirement, as the principals in this category are substantially older than the rest of the sample. The bottom panel of Table 4 confirms that first-time principals typically come from the ranks of teachers and assistant principals.

Tables 5 and 6 examine the various job transitions more closely. The average wage growth and changes in school attractiveness (as summarized by our predicted achievement measure)

associated with job transitions are displayed in Table 5. These demonstrate the opportunity for principals to increase their salary and/or school context through job mobility. If a principal remains in the same position, the average real wage increase is 1.6 percent per year, but if he or she changes schools it can be substantially higher. For new positions in the same district real wages increase by 4.1 percent, and for positions in a different district the new real wage is 6.5 percent higher. Individuals who accept a new position as a district-level administrator do even better in terms of salary, with new salaries that are 7.3 percent higher in real terms. However, if the principal changes to a lower-level position within the campus, the real wage goes down by 3.8 percent on average. An important caution to interpreting these cross-sectional patterns is the likelihood that they reflect not only differences across positions, but also differences across the principals who either choose or have imposed on them each transition.

The relationships between wage growth and the evolution of campus attractiveness do not suggest systematic trade-offs between the two for the typical transition. In fact, the campus-level transition that is associated with the highest average wage gains is also associated with the greatest average improvements in schooling environment.

Table 6 breaks the job transition and real wage changes down by the accountability rating achieved by the campus where the principal is currently working. In other words, we can see the effect of the school rating in period t on relative employment and wage outcomes in period $t+1$. These results suggest that the accountability scores may have a substantial impact on future opportunities. For example, the top row in the table indicates that principals whose schools are rated as Exemplary have the highest probability of remaining in their current position (80.1 percent), while principals in Low Performing schools keep their jobs into the following year only 60.7 percent of the time. For those remaining, real wage increases are highest for those leading Exemplary schools (1.8 percent) and lowest for the Low Performing ones (1.3 percent). While principals at Low Performing schools transition into higher paying positions more frequently (in percentage terms), their relative wage growth upon "promotion" is much less (only 3.7 percent in the case of district-level positions, as compared to 11.1 percent for those who led Exemplary schools).

The patterns implied by the regression results in Table 7, which condition on current-year campus and individual controls, are broadly consistent with the unconditional patterns. Here the dependent variable is the change in log wages from the current year to the next. The coefficient

estimates are reported only for the key control variables of interest, which describe the ratings category and achievement level at the current school. Since the excluded ratings category is Exemplary, the results in columns 1–2 demonstrate that the lower the category the smaller is the wage increase. Interestingly, the campus achievement level (standardized pass rate) also enters positively and significantly – suggesting that there is an independent effect beyond the most salient summary statistic provided by TEA. The coefficient estimate suggests that a one standard deviation improvement in campus achievement is associated with real wage growth that is approximately 1.5 percentage points higher. Principals of schools that have shown academic improvement also seem to experience greater wage gains (columns 3–4), whether that improvement comes with a boost in ratings or not. Note that there is very little change in any of these results when individual-level controls are added to the regression along with the campus-level controls (right column of each pair of results).

5. Discussion

The empirical evidence that we have assembled so far suggests that labor market opportunities and career concerns potentially provide effective incentives for public school administrators to exert effort to improve academic performance. To the extent that administrators are mobile, the information provided by the testing regimes allow principals whose schools do better to earn more by getting promoted to higher paying positions at other schools and at the district level. It does not appear, however, that principals are rewarded financially for better test scores if they remain in their current position. On the other hand, principals whose schools do worse leave their jobs much more often for positions in which they experience lower wage growth. Understanding the labor market for administrators may be a key element to addressing the agency problem in public education, and may add an additional axis (on the supply side) on which academic performance can be improved through competition among schools. In future work, we will attempt to link labor market competition with productive outcomes by examining the extent to which campuses that hire "better" principals subsequently improve the measured performance of their schools.

As we proceed through this project, we will explore the operation of the labor market for administrators at a more micro level. In particular, to the extent that differences in administrator age, the extent of geographic labor markets, and school district size affect the mobility of

principals, these differences may be associated with different incentives for improving school performance. We would also ideally like to test for changes in the implicit rewards for campus achievement from before to after the introduction of the accountability regime in 1994. The proliferation of the summary performance measures may result in a distinction between the informativeness of various signals about principal quality and their return to individuals the labor market. Gaming behavior might be a logical response if the labor market rewards signals that are not directly related to administrator-facilitated increases in student achievement. Therefore, along with directly evaluating various theories in personnel economics, our analysis may have policy suggestions for how to improve the measured incentive effects and make accountability programs more effective.

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Table 1: Salary distributions by occupational role

	Base salary ($2006)		
	10^{th} percentile	Median	90^{th} percentile
Teacher	43,608	59,160	79,242
Subordinate campus administrator	46,750	59,298	74,399
Assistant principal	51,021	60,232	73,129
Principal	56,421	69,132	84,880
Subordinate district administrator	57,774	70,254	89,517
Superintendent/Asst. superint.	60,537	73,437	95,880

Notes: These averages by primary role are based on the sample of individuals observed as principals at some point during our sample period.

Table 2: Campus-level principal turnover descriptive statistics, by year

Year	Number of Campuses	Turnover rate	Base salary ($2006)		
			10th percentile	Median	90th percentile
1994	5,029	.169	54,773	67,233	81,326
1995	5,074	.175	54,752	67,147	81,328
1996	5,136	.180	55,250	67,639	82,382
1997	5,230	.180	56,350	68,087	82,901
1998	5,300	.184	57,492	69,159	84,117
1999	5,382	.171	57,624	69,834	85,477
2000	5,459	.211	58,914	71,368	86,788
2001	5,555	.188	59,065	71,748	86,995
2002	5,634	.211	59,651	72,949	88,856
2003	5,718	.188	59,572	73,245	88,748
2004	5,785	.205	58,909	72,566	88,369
2005	5,861	.174	58,248	71,340	86,690
2006	5,914	-----	58,089	70,893	86,319
Average	5,467	.187	57,497	70,276	85,858

Notes: The sample consists of all regular campuses for the years 1994 through 2006, as described in the text. The turnover rate is the fraction of campuses headed by a new principal in the following year.

Table 3: Campus-level principal turnover descriptive statistics, by campus characteristics

	Share of campuses	Turnover rate	Median base salary
Overall	1.00	.187	70,276
By campus type			
Elementary	.607	.167	69,836
Middle	.209	.204	71,514
Secondary	.163	.227	72,605
By campus ratings category			
Exemplary	.142	.156	71,914
and below median "productivity"	.049	.148	73,917
and above median "productivity"	.093	.161	70,557
Recognized	.300	.174	69,751
and below median "productivity"	.101	.176	68,674
and above median "productivity"	.198	.174	70,352
Acceptable	.541	.198	70,036
and below median "productivity"	.335	.210	69,243
and above median "productivity"	.207	.181	71,220
Low Performing	.018	.321	73,004
and below median "productivity"	.015	.329	73,000
and above median "productivity"	.002	.272	77,645

Notes: The sample consists of all regular campuses for the years 1994 through 2006, as described in the text. The turnover rate is the fraction of campuses headed by a new principal in the following year. The first row averages across all campuses and years, while the remaining rows show this rate among subsets of campuses as indicated.

Table 4: Campus-level principal turnover regression results

Independent variable	Dependent variable: Indicator for new principal in following year			Dependent variable: *ln*(base salary)		
	(1)	(2)	(3)	(4)	(5)	(6)
Ratings category						
Recognized	0.016		0.010	-0.014		-0.011
	(0.005)		(0.005)	(0.002)		(0.002)
Acceptable	0.042		0.016	-0.027		-0.017
	(0.005)		(0.006)	(0.002)		(0.002)
Low Performing	0.163		0.095	-0.043		-0.023
	(0.017)		(0.017)	(0.005)		(0.005)
Achievement level		-0.034	-0.028		0.014	0.011
		(0.002)	(0.003)		(0.001)	(0.001)

Notes: The sample consists of all regular campuses for the years 1994 through 2005 as described in the text. The dependent variable is an indicator for a new principal at the campus in the following year in columns 1-3, and is log base salary for the current principal in columns 4-6. Controls for the academic performance of the campus are varied across the columns as shown. All specifications otherwise include the same set of control variables: at the campus level: student grade distribution, student race/ethnicity distribution, student economic disadvantage and LEP rates, *ln*(enrollment); at the district level: *ln*(district enrollment), *ln*(district wealth per pupil), percent district property wealth residential, indicators for 20 educational service center regions; and year fixed effects. The turnover regressions are estimated using a Probit specification, and marginal effects evaluated at the sample means are shown. The log wage regressions are estimated via ordinary least squares. In all cases, standard errors robust to arbitrary correlation across campuses over time are shown in parentheses. The omitted ratings category is "Exemplary."

Table 5: Job transition rates by category

	Number	Fraction
Transitions for full-time principals, 1989–2005		
Remained principal at same campus following year	75,787	.788
Became principal at a different campus in the same district	5,010	.052
Became principal at a different campus in a different district	2,163	.023
"Promoted" to district-level position in the same district	2,610	.027
Principal to district-level support position	1,739	.018
Principal to superintendent or assistant superintendent	871	.009
"Promoted" to district-level position in a different district	749	.008
Principal to district-level support position	257	.003
Principal to superintendent or assistant superintendent	492	.005
"Demoted" to teacher, asst. principal or campus support position	3,387	.035
Principal to teacher	1,506	.016
Principal to campus-level support position	387	.004
Principal to assistant principal	1,494	.016
Became a part-time principal (any campus)	493	.005
Left the sample	5,925	.062
Total	96,124	1.000
Transitions into first position as a full-time principal 1990–2006		
Teacher to principal	2,805	.209
Campus-level support position to principal	1,085	.087
Assistant principal to principal	8,097	.602
District-level support position to principal	760	.057
Superintendent or assistant superintendent to principal	204	.015
Part-time principal to principal	500	.027
Total	13,451	1.000

Notes: The sample in the top panel consists of all individuals who are current (year t) full-time principals at regular campuses for the years 1989 through 2005. The transition rates are based on the positions held by these full-time principals in the following year ($t+1$). The sample in the bottom panel includes all individuals who appear for the first time as a full-time principal at a regular campus in one of the years 1990 through 2006. Here, the transition rates are based on the positions held by these new full-time principals in the prior year ($t-1$).

Table 6: Average changes in wages and school contexts by job transition category

Transitions for full-time principals, 1989–2005	Fraction of sample	Real Wage Growth	Change in predicted achievement
Remained principal at same campus following year	.788	.014	-.002
Became principal at different campus, same district	.052	.038	.015
Became principal at different campus, different district	.023	.059	.085
"Promoted" to district-level position, same district	.027	.070	----
"Promoted" to district-level position, different district	.008	.082	----
"Demoted" to subordinate campus-level position	.035	-.039	-.028
Became part-time principal, any campus	.005	.040	-.029
Left the sample	.062	----	----
Total	1.00		

Notes: The sample consists of all individuals who are current (year *t*) full-time principals at regular campuses for the years 1989 through 2005. The transitions rates are based on the positions held by these principals in the following year ($t+1$). Real wage growth is the difference in base salary (in \$2006) between the next-year and current jobs, relative to the base salary at the current job. The change in predicted achievement from the current-year to the next-year campus is meant to capture whether the new campus context is generally a more or less attractive one. This variable is only defined for transitions to campus-level positions.

Table 7: Job transitions and wage changes by campus performance category

Transitions for full-time principals, 1994–2005	*Campus Accountability Rating Category*							
	Exemplary		Recognized		Acceptable		Low Performing	
	Share in transition category	Real wage growth	Share in transition category	Real wage growth	Share in transition category	Real wage growth	Share in transition category	Real wage growth
Remained principal at same campus following year	.814	.019	.797	.016	.773	.016	.625	.012
Became principal at different campus, same district	.042	.043	.048	.043	.053	.039	.061	.037
Became principal at different campus, different district	.019	.082	.023	.079	.024	.056	.037	.069
"Promoted" to a district-level position, same district	.026	.104	.027	.079	.032	.065	.062	.060
"Promoted" to a district-level position, different district	.010	.122	.007	.096	.008	.070	.009	-.086
"Demoted" to subordinate campus-level position	.026	-.016	.033	-.040	.040	-.035	.104	-.043
Became part-time principal, any campus	.006	.052	.005	.070	.004	.041	.005	.030
Left the sample	.055	----	.060	----	.064	----	.097	----

Notes: See the Notes to Table 6. The sample is restricted to individuals who are principals in years following the introduction of school accountability (1994), since campus ratings are not available in earlier years.

Table 8: Job transitions and wage changes by own "productivity"

Transitions for principals, 1989–2005	*Principal "productivity"* Top quartile		2nd quartile		3rd quartile		Bottom quartile	
	Share in transition category	Real wage growth	Share in transition category	Real wage growth	Share in transition category	Real wage growth	Share in transition category	Real wage growth
Remained principal at same campus following year	.764	.014	.820	.014	.813	.014	.741	.013
Became principal at different campus, same district	.055	.043	.051	.034	.053	.039	.056	.035
Became principal at different campus, different district	.023	.063	.021	.058	.022	.061	.026	.052
"Promoted" to a district-level position, same district	.034	.081	.022	.072	.023	.070	.031	.053
"Promoted" to a district-level position, different district	.009	.095	.006	.090	.006	.077	.010	.069
"Demoted" to subordinate campus-level position	.039	-.033	.027	-.032	.027	-.036	.050	-.051
Became part-time principal, any campus	.005	.055	.004	.030	.005	.051	.006	.028
Left the sample	.070	----	.050	----	.050	----	.080	----

Notes: See the Notes to Table 6. The productivity measure is described in the text.

Table 9: Individual-level real wage growth regression results

Sample	Dependent variable = change in log wages from *t* to:		
	t + 1	*t* + 3	*t* + 5
All years, all principals	0.0024	0.0078	0.0117
	(0.0004)	(0.0009)	(0.0013)
	[0.014]	[0.048]	[0.086]
Post school accountability only (1994+)	0.0028	0.0097	0.0155
	(0.0005)	(0.0012)	(0.0020)
	[0.017]	[0.057]	[0.102]
Campus stayers only	-0.0000	0.0058	0.0094
	(0.0002)	(0.0008)	(0.0011)
	[0.013)	[0.044]	[0.081]
Campus leavers only	0.0167	0.0194	0.0223
	(0.0029)	(0.0034)	(0.0053)
	[0.024]	[0.067]	[0.113]

Notes: Each cell shows the results from a separate ordinary least squares regression. The dependent variable in all cases is the change in log base salary (in $2006), but what varies across the columns is whether the growth is defined over one, three or five years. What varies across the rows is the sample used for the estimation. The first row corresponds to the full sample of all individuals who are current full-time principals at regular campuses for the years 1989 through 2005. The sample is restricted to years 1994 and later in the second row. The third row includes only principals who remain at the same campus in the next year, while the fourth includes only those who switch campuses (and perhaps also districts) in the following year. The coefficient on the standardized pass rate at the principal's campus in the current year is shown, along with standard errors (robust to clustering at the individual level) in parentheses and the mean of the dependent variable in square brackets. All specifications include the following controls: individual principal characteristics (age, age squared, gender, race/ethnicity, and highest educational degree obtained), time-varying campus characteristics (), and district-year fixed effects.

Table 10: Individual-level real wage growth regression results

Independent variable	Dep. Var. = change in log wages from t to $t+1$		
	(1)	(2)	(3)
Standardized pass rate (t)	0.0028		0.0022
	(0.0005)		(0.0005)
Standardized pass rate prior year ($t-1$)		0.0026	
		(0.0005)	
Change in pass rate ($t-1$ to t)		0.0020	
		(0.0005)	
Campus accountability rating			
Recognized			-0.0024
			(0.0009)
Acceptable			-0.0033
			(0.0011)
Low performing			-0.0102
			(0.0034)

Notes: The sample consists of all individuals who are current (year *t*) full-time principals at regular campuses for the years 1994 through 2005. The dependent variable in all cases is the change in log wages. This wage growth measure is the difference in log base salary (in $2006) between the next-year and current jobs. Controls for the academic performance of the current-year campus are varied across the columns as shown. Also, the right-most set of results within each columns adds individual principal characteristics, such as age, gender, race/ethnicity, and highest educational degree obtained. All specifications otherwise include the same set of control variables described in the Notes to Table 3. The regressions are estimated by ordinary least-squares. Standard errors robust to arbitrary correlation across observations from the same principal over time are shown in parentheses. The omitted ratings category is "Exemplary."

Table A-1: Staff roles

Staff type	Code	Description
Teacher	029	A professional employee required to hold a valid teacher certificate or permit in order to perform some type of instruction to students.
Assistant Principal	003	Assists the principal of a particular campus in any duties the principal may deem appropriate.
Principal	020	Serves as the instructional leader of the school whose duties include selecting teachers for the campus, setting education objectives, developing budgets for the campus, and working with school professionals to prepare individual development plans.
Campus-level Professional Support Staff		
Counselor	008	Provides guidance and counseling services to students.
Supervisor	028	Supervisor of teachers who provides consultant services to teachers in a grade level, adjacent grades, in a teaching field or group of related fields.
Teacher Facilitator	041	Serves as exemplary role model in assisting teachers with improving their classroom performance.
Department Head	054	Serves as head or chairman of a subject area department on a campus.
Other campus professional personnel	058	Serves as a professional staff member at a single campus. Some examples are campus/community liaisons, campus volunteer coordinators, dean of boys, dean of girls, and instructional officers assigned to a single campus.
District-level Administrative Staff		
Superintendent	027	The educational leader and administrative manager of the school district.
Asst. Superintendent	004	Assists the superintendent of a particular school district in any duties the superintendent deems appropriate. Persons assigned to this role usually perform functions associated with more than one campus.
District-level Professional Support Staff		
Instructional Officer	012	Serves under the superintendent, or higher grade instructional administrative officer, as the key specialist for a major instructional or pupil service program.
Other non-campus professional personnel	080	These are professional, non-instructional staff. Includes administrators/non-instructional department heads, other supervisory staff, and any other professional level staff in a functional area (food service, maintenance and operations, …) at the district level.

Notes: The source for these definitions is the TEA document titled "About Staff 2006," available on the web (http://www.tea.state.tx.us/adhocrpt/abstf06.html).

Table A-2: Raw data from PEIMS Personnel Data Files, 1989-2006

	Teachers		Assistant Principals		Principals		Campus-level Professional Support Staff		District-level Administrative Staff		District-level Professional Support Staff	
Year	No. of positions	Median wage	No. of positions	Median wage	No. of positions	Median wage	No. of positions	Median wage	No. of positions	Median wage	No. of positions	Median wage
1989	204,378	23,996	3,656	35,250	5,608	40,187	8,743	32,477	3,630	44,001	---	---
1990	208,392	25,060	4,009	36,312	5,743	42,398	10,052	33,554	3,551	46,884	---	---
1991	215,437	26,070	4,226	38,961	5,769	44,700	11,313	35,154	3,466	49,029	---	---
1992	223,041	26,850	4,490	40,179	5,829	46,148	11,720	36,026	3,470	51,000	---	---
1993	231,033	27,817	4,479	41,533	5,971	47,710	13,455	36,939	1,779	59,173	5,270	44,500
1994	238,137	28,557	4,849	42,410	6,039	48,915	13,482	37,437	1,747	60,824	5,600	45,411
1995	246,114	29,091	5,106	43,410	6,116	50,251	14,112	38,009	1,758	62,682	6,127	46,109
1996	253,423	31,300	5,396	44,505	6,214	52,028	14,497	39,288	1,767	65,000	6,933	46,104
1997	260,955	32,072	5,630	45,738	6,397	53,698	14,809	40,595	1,960	65,335	7,984	46,993
1998	268,585	33,090	5,975	46,819	6,542	55,268	15,665	41,960	1,841	69,446	8,075	49,000
1999	273,274	33,642	6,266	47,949	6,669	57,000	15,974	42,940	1,865	71,527	9,508	48,507
2000	282,301	36,842	6,573	50,676	6,817	60,343	16,502	46,150	1,970	74,477	10,239	51,449
2001	288,783	37,299	6,997	52,512	6,968	62,127	19,133	46,748	1,919	77,135	11,467	52,268
2002	298,744	37,999	7,317	53,781	7,088	64,201	20,118	47,778	2,066	79,254	20,561	38,625
2003	304,717	38,676	7,620	54,891	7,142	65,858	20,597	48,380	2,051	82,400	12,585	55,014
2004	307,192	39,162	7,764	55,436	7,208	67,689	22,696	48,529	2,054	84,500	12,613	55,718
2005	313,474	39,921	8,062	56,395	7,347	68,231	22,916	48,651	2,043	87,633	12,936	56,662
2006	321,943	40,608	8,384	57,261	7,443	69,872	23,839	49,619	2,084	89,916	13,286	58,350

Notes: A "position" in the data is a campus-role combination; since a single individual occasionally holds more than one position simultaneously (either filling more than one role on the same campus or the same role at more than one campus) the number of positions exceeds the number of individuals in the dataset. See Table A-1 for a description of the six position categories in this table. Wages are base salaries (excluding bonuses) and are in nominal dollars.