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Determinants of the Compensation and Mobility of School Superintendents

Abstract

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Keywords

compensation, mobility, school superintendents, test scores, school tax rates

Disciplines

Benefits and Compensation | Education | Elementary and Middle and Secondary Education Administration | Labor Economics | Labor Relations

Comments

Suggested Citation

Ehrenberg, R. G., Chaykowski, R. P., & Ehrenberg, R. (1988). Determinants of the compensation and mobility of school superintendents [Electronic version]. *Industrial and Labor Relations Review*, 41(3), 386-401.

Required Publisher Statement

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DETERMINANTS OF THE COMPENSATION AND MOBILITY OF SCHOOL SUPERINTENDENTS

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Analyzing 1978-83 panel data from more than 700 New York State school districts, the authors find evidence that school superintendents were rewarded, both by higher salary increases and by enhanced opportunities to move to better-paying jobs, for having low school tax rates and high educational achievement within their districts, relative to the values of those variables in comparable school districts in the state. The rewards were, however, quite small. The analysis also suggests that the superintendents themselves did not significantly influence either school tax rates or educational test scores in their districts.

THE April 1983 report of the National Commission on Excellence in Education, *A Nation at Risk*, focused public attention on the need to reform public education. A proposal to institute merit pay plans for teachers, which historically

have not met with much success in public education, was among the most hotly debated recommendations in the report. In contrast, little attention has been directed to the role that educational administrators (school principals and superintendents) play in the educational process or to the ways in which they are compensated. Given the large role administrators play in recruiting and supervising teachers, designing curricula, setting educational goals, and managing school district resources, they might reasonably be supposed influential in determining what and how much students learn as well as how much taxpayers pay for public education.¹ Their relative neglect by participants in the educational debate in recent years is therefore surprising.

Although there have been a few case studies and statistical analyses of superintendents' turnover and mobility, very little

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¹ See Ehrenberg, Chaykowski, and Ehrenberg (1986) for citations to the "effective school" literature that stresses this point.

is known about the factors that influence the compensation of school administrators or their mobility. In particular, it is not known whether superior "performance" by a school district results in rewards for its administrators in the form of higher compensation or greater opportunities for mobility to higher-paying positions.² That question is clearly important for policy debate; if it is found that school administrators' compensation is not even implicitly tied to their districts' "performance," a case can be made for building explicit incentives for performance into their compensation arrangements.

To shed light on this issue, we have analyzed the compensation and mobility of school superintendents in New York State during the 1978-79 to 1982-83 period. Our focus is on school superintendents rather than principals not only because the former are the chief operating officers of school districts, but because their salaries are determined through individual "negotiations" with school boards and their salary data were made available to us, whereas school principals—especially those in large districts—tend to be members of a union, with collectively negotiated salary increases, and their salary data were unavailable to us.

Of course, a crucial element in our study is the definition of "performance." School districts and their school board members are idiosyncratic and evaluate superintendents' performance in a wide variety of ways; our methodology, in contrast, is to focus on a few well-defined outcomes. Specifically, we assume that school districts value high educational performance and low school tax rates, each relative to the comparable outcome in similar school districts in the state.³

² None of the previous studies (see Ehrenberg, Chaykowski, and Ehrenberg 1986 for citations) attempted to measure "performance" and to see if it matters. Indeed, March and March (1977) argued that the mobility of superintendents is almost a random process. Their approach, however, was criticized by Schmittlein and Morrison (1981).

³ A district can simultaneously have high test scores and low tax rates if the district's administrators efficiently manage both financial and educational

Preliminary Analysis⁴

Our analysis utilizes data on the more than 700 school districts in New York State during the 1978-79 to 1982-83 period obtained from the New York State Education Department's "Basic Educational Data System" (BEDS) annual school district tapes. Unfortunately, no data on nonsalary compensation items are available on the BEDS tapes, so we can analyze only salaries rather than total compensation. Excluded from the sample each year were New York City (which, because of the size of its school system and the large number of its local district school boards, is not comparable to any other district in the state), districts in which the superintendent's position was vacant, and districts that failed to report salary information.

The mean salary of superintendents in the sample rose from slightly under \$35,000 in 1978-79 to over \$44,000 in 1982-83. Each year the variation in salaries across districts was large; for example, in 1982-83 superintendents in the sample earned between \$20,000 and \$71,000, and the standard deviation in salaries was \$10,000. Although much of this variation is clearly due to the wide variation of school district sizes in the sample, we demonstrate below that other factors are also important.

The BEDS data permit us to determine if a superintendent remained in the same school district for two consecutive years, moved from one district to another in the state during the period, or moved from a school district in the state to "out of sample" status. In the last case, the superintendent may have retired or died, moved to another superintendency outside New York State (though previous studies suggest that the vast majority of school superintendents serve in only one state during their lifetime), moved to a different educational position (nonsuperin-

resources and effectively motivate school district personnel.

⁴ Tables of descriptive statistics on superintendents' salaries and mobility during the period are available in Ehrenberg, Chaykowski, and Ehrenberg (1986).

tendent) in another district in the state, or switched to a noneducational position—or his school district may simply have failed to report data in the second year.

The data suggest that the *annual* turnover rates of school superintendents were only 12 to 19 percent. Each year only 4 to 6 percent of the superintendents moved to another district in the state, and 8 to 13 percent dropped out of the sample. Below, using multinomial logit analysis, we attempt to explain the determinants of the mover/stayer status of superintendents each year.

Aside from school district performance, what forces might be expected to influence a superintendent's salary? Some of the possible factors that come to mind are characteristics of the school district: larger districts (where a superintendent's job is more difficult), wealthier districts (where the demand for education is likely to be greater), districts containing a high proportion of highly educated adults (who are

likely to have a strong "taste" for education), and districts with students who have special educational needs (such as those with a large proportion of minority students) are all likely to pay higher salaries in an effort to attract and retain high-quality superintendents. Other possible factors are characteristics of the superintendent: it is reasonable to expect more experienced and more highly educated superintendents to command higher salaries. Table 1 contains descriptions of the variables we use to capture these and other characteristics that are hypothesized to influence superintendents' salaries.

Table 2 reports estimates of annual cross-section salary equations of the form

$$(1) \log(W_i) = a_0 + a_1X_i + a_2S_i + \epsilon_i,$$

where W is the annual salary of the superintendent, X is a vector of school district characteristics, S is a vector of

Table 1. Variable Descriptions.

Variable	Description
LENR	Logarithm of total enrollment in the district in the year.
LVAL	Logarithm of the full value of property in the district per enrolled student in the year.
LY1	Logarithm of per capita personal income in the county in the year.
LY2	Logarithm of median family income in the district in 1979.
PNW	1979 percentage of the district's population that was nonwhite.
PHED	1979 percentage of the district's adult population with greater than a bachelor's degree.
PCHL	1979 percentage of the district's households with children at home.
POOC	1979 percentage owner-occupied housing in the district.
PCOL	1979 percentage of the district's adult population with some college or a bachelor's degree.
PURB	1979 percentage of the district's population residing in urban areas.
DDEG	1 = superintendent had a doctoral degree in the year; 0 = no such degree.
CDEG	1 = superintendent had a certificate of advanced study in the year; 0 = no such degree.
EXPS	Superintendent's total number of years' experience in other school districts as a superintendent.
TEN	Superintendent's years of tenure in the current district.
EXPG	Superintendent's years since receiving a bachelor's degree.

Sources:

(1) SAL, LENR, LVAL—New York State Education Department, "Basic Educational Data System" (BEDS) School District Tapes for 1978–79 to 1982–83; and New York State Education Department, "Financial Data System" (ST3) School District Tapes for 1978–79 to 1982–83.

(2) LY1—U.S. Department of Commerce, Bureau of Economic Analysis, unpublished tabulations for 1978 to 1982.

(3) LY2 to PURB—U.S. Bureau of the Census, *1980 Census of Population, School District Data File* for New York State.

(4) DDEG to EXPG—American Association of School Administrators, *Who's Who in Educational Administration*, 1976–77, 1980–81 editions; and the survey of school superintendents in New York State conducted by the authors in the summer of 1985.

Table 2. Determinants of School Superintendents' Salaries in New York State:
Annual Cross-Sections.
(absolute values of t statistics in parentheses)

Variable	Logarithm of Annual Salary (SAL)				
	1978-79	1979-80	1980-81	1981-82	1982-83
LENR	.127 (22.5)*	.113 (20.0)*	.117 (21.2)*	.111 (20.7)*	.110 (20.0)*
LVAL	.045 (5.8)*	.025 (4.1)*	.028 (4.8)*	.019 (3.9)*	.011 (2.3)*
LY1	.191 (5.2)*	.228 (6.5)*	.228 (6.3)*	.273 (8.4)*	.294 (9.3)*
LY2	.151 (3.6)*	.146 (3.4)*	.189 (4.3)*	.152 (3.6)*	.120 (2.9)*
PNW	.178 (2.6)*	.072 (1.2)	.032 (0.4)	-.071 (1.0)	-.111 (1.7)
PHED	.357 (2.5)*	.449 (3.0)*	.367 (2.5)*	.445 (3.1)*	.494 (3.4)*
PCHL	.200 (2.0)*	.009 (0.0)	.027 (0.3)	-.001 (0.0)	.074 (0.8)
POOC	-.073 (1.0)	.022 (0.3)	-.049 (0.7)	-.036 (0.5)	-.080 (1.0)
PCOL	.185 (1.8)	-.147 (1.3)	.105 (1.1)	.224 (2.2)*	.218 (2.1)*
PURB	.014 (1.0)	.025 (1.6)	.000 (0.0)	-.019 (1.2)	-.012 (0.9)
DDEG	-.008 (0.7)	.006 (0.6)	.010 (1.0)	.013 (1.4)	.023 (2.3)*
CDEG	.000 (0.0)	-.016 (1.4)	-.014 (1.3)	-.032 (3.1)*	-.016 (1.7)
EXPS	.002 (1.1)	-.000 (0.3)	.001 (0.6)	-.000 (0.1)	-.000 (0.2)
TEN	.006 (5.3)*	.006 (5.0)*	.006 (5.5)*	.004 (3.6)*	.007 (5.7)*
EXPG	.002 (2.1)*	.003 (3.3)*	.002 (2.1)*	.002 (2.2)*	.001 (0.8)
R ²	.842	.845	.840	.836	.828
N	590	557	558	570	574

* Also included were an intercept term and dummy variables for nonreporting of the superintendents' previous experience, current job tenure, and year of bachelor's degree. Experience and job tenure were available for 35 to 65% of the sample each year, and years since degree was typically available for 70 to 80% of the sample.

* Statistically significant at the .05 level (two-tailed test).

characteristics of the superintendent, and ϵ is a random error term.⁵

As noted in Table 1, the school district data used in the analysis come from a variety of federal and state sources. The characteristics of the superintendents are taken from two volumes of *Who's Who in Educational Administration*, the directory of members of the American Association of School Administrators, and the responses to a survey of all school superintendents employed in New York State in 1984-85 that was conducted by the authors in late May to early July of 1985. Because fewer than half of the superintendents in the sample belonged to the professional association and the response rate of incum-

bents in 1984-85 to the survey was about 70 percent, many observations lacked data on some or all of the superintendents' characteristics. Furthermore, we could not obtain school district data for some of the districts. The exclusion from the sample of observations for which either the school district's characteristics or the superintendent's degree information was missing reduced the sample sizes to between 550 and 600 observations each year.

As expected, the characteristics of school districts prove to be important determinants of superintendents' salaries. *Ceteris paribus*, in each year, larger districts (as measured by the logarithm of total enrollment, LENR), wealthier districts (as measured by the logarithms of property values per enrolled student [LVAL], per capita personal income in the county [LY1], or census year 1979 median family income in the school district [LY2]), and districts that place a high value on education (as measured by the percentage of the district's adult population with education

⁵ If school district "performance" does influence superintendents' salary levels, estimation of equation (1), which omits performance, will yield biased coefficients unless the performance measures are uncorrelated with the variables included in (1). As will become clear, we have constructed performance measures that are uncorrelated with the variables in (1).

beyond a bachelor's degree, PHED) all are associated with higher superintendents' salaries.⁶

In contrast, only two of the superintendents' characteristics—years of tenure in the current district (TEN) and years since receiving a bachelor's degree (EXPG) (a rough proxy for age or total labor market experience)—prove to be statistically significant.⁷ Moreover, quantitatively the effects of these variables are very small, with the rate of return per year of tenure being roughly 0.6 percent and that per year since degree being roughly 0.2 percent. Somewhat surprisingly, neither the possession of a doctorate degree (DDEG) or a certificate of advanced study in administration (CDEG)—the latter an intermediate degree between a masters and a doctorate—nor the total number of years of previous experience as a superintendent in other school districts (EXPS) is systematically associated with salary.

A widely accepted generalization about the mobility of superintendents, and one supported by the results of our survey, is that they typically move (at least during the early stages of their careers) from smaller to larger and from poorer to wealthier districts. It may be, therefore, that personal characteristics affect salary indirectly by influencing the characteristics of the school district in which the superintendent is located, rather than directly by influencing salary decisions within a district.

To test this hypothesis, the logarithm of property value per enrolled student and the logarithm of total enrollment in the superintendent's district were both regressed each year on the personal characteristics of the superintendent (excluding years of tenure in the current district). The results (see Ehrenberg, Chaykowski, and Ehrenberg 1986) suggest that having

a doctorate, having more prior experience as a superintendent in other districts, and being older all were associated with employment in larger school districts, and having a doctorate was also associated with being employed in wealthier districts.

These findings have important implications for the analysis that follows of the relationship between superintendents' compensation and school districts' performance. Even if, within a given school district, no relationship is found between a superintendent's compensation and his school district's performance, superintendents might still be rewarded for district performance by increased opportunities for mobility to better-paying positions.

Evaluating the Performance of School Districts

We assume in this study that school boards value high academic test scores (high educational output) and low school tax rates (more money available for other public and private uses), each relative to the comparable outcome in similar school districts in the state, and that they evaluate a superintendent (at least implicitly) by his or her district's performance on these criteria. It is natural to ask how these measures correspond to the criteria that superintendents believe school boards actually use in their evaluation. To answer this question, the survey of school superintendents that we conducted asked the respondents to list the criteria they believed their school boards used in their evaluation. Although we gave keeping test scores high and tax rates low as two examples of criteria that might be used (as well as "maintaining good relations with the board"), the question we asked was open-ended. Each respondent was also asked to attach to the survey form a copy of the formal evaluation instrument in effect at the time of the survey, if there was one. Eighty percent (397) of the 496 respondents to our survey included a list of criteria in their response, and about 22 percent (86) of those 397 attached formal evaluation instruments.

We assigned the criteria mentioned by

⁶ Both median family income in the school district and per capita income in the county were included as explanatory variables here (and in parts of the analysis below) because the former was available only in the census year.

⁷ We say "his" throughout because over 97 percent of the approximately 1,010 superintendents in our sample were men.

superintendents to twelve broad classifications and made a count of responses under each classification (Table 3). Since most superintendents mentioned more than one criterion, the total count across categories far exceeds the number of respondents.

Perhaps the most striking result, given that keeping test scores high and tax rates low were two of the only three examples provided for this item on the questionnaire, is that the most commonly mentioned criteria were community/public relations and school board relations. Fiscal management (the category that would include, but is not limited to, keeping tax rates low) came in fourth on the list and was mentioned by about two-thirds of the respondents. Academic performance and achievement (the category in which keeping test scores high would fall) was eighth on the list and was mentioned by fewer than one-third of the respondents.

What are the implications of these

Table 3. New York State Public School Superintendents' Perceptions of the Criteria School Boards Use in Evaluating Their Performance.

<i>Response</i>	<i>Number</i>
Mentioned that Criteria Included:	
Community/Public Relations	318
School Board Relations	294
Staff and Personnel Management	287
Fiscal Management	267
Curriculum Development, Educational Planning and Leadership	202
Professional and Personal Development	132
General Management and Administration	129
Academic Performance and Achievement	125
Facilities Management	50
Student Services and Relations	49
Student Discipline	26
Parent Relations	25
Included a Formal Evaluation Instrument	86

Source: survey sent by the authors to approximately 700 school superintendents in New York State (excluding New York City) in May to July, 1985. 496 superintendents responded to the survey, and of that number, 397 responded to the question on criteria used in evaluating superintendents' performance. Response rates did not vary substantially across size classes of school districts.

findings for the use of the objective performance measures that we propose? On the one hand, it is hard to think of readily available objective measures for most of the categories of criteria mentioned by respondents; measures of fiscal management and academic performance and achievement may be the best one can do. On the other hand, the questionnaire results clearly indicate that the two measures we use as indicators of how superintendents are evaluated in compensation decisions are measured with error; if the errors are random, the coefficients of our performance variables will be biased toward zero in the mobility and compensation change equations. Furthermore, given that more than twice as many respondents mentioned fiscal management as did academic performance, one might expect that, on average, the former will prove to be more important than the latter in explaining compensation and mobility.

To show how the performance measures were constructed, in Table 4 we present estimates of tax rate and educational outcome equations for 1979-80. (Separate equations were estimated for each year and the results are very similar across years.) The tax rate variable is the logarithm of the *full-value* property tax rate in the school district (total school district property tax revenue divided by total value of taxable property in the school district). The educational outcome variables are the logarithms of the percentage of the district's students who fall below the state reference point on a standardized sixth grade mathematics examination and the average percentage who fall below the state reference point on standardized third and sixth grade reading and mathematics examinations.⁸ Students who fall below the state reference point are deemed

⁸ We isolate the sixth grade mathematics test because it was the only one of the four tests that did not undergo revision during the period and that was given in all five years. As a result, although the entire battery of tests can be used to construct a performance measure when analyzing a single year's cross-section, the longitudinal analyses in this paper, which pool data across years, are restricted to using the single sixth grade mathematics test.

Table 4. 1979-80 Tax Rate and Educational Outcome Equations.
(absolute values of t statistics in parentheses)

Variable	$\log(T)$	$\log(GM)$	$\log(AS)$
LVAL	-.100 (7.0)**	-.036 (1.2)	-.033 (1.6)
LY1	-.001 (0.0)	-.243 (1.3)	-.029 (0.2)
LY2	.180 (1.8)*	-.253 (1.2)	-.397 (2.9)**
PNW	.691 (4.6)**	1.351 (4.2)**	1.111 (5.2)**
PHED	1.009 (2.8)**	-1.331 (1.8)*	-1.801 (3.5)**
PCHL	.979 (3.7)**	.670 (1.2)	.374 (1.0)
POOC	-.417 (2.1)**	-.689 (1.7)*	-.653 (2.3)**
PCOL	.388 (1.4)	-.685 (1.2)	-.634 (1.7)*
PURB	.271 (7.6)**	-.042 (0.6)	-.009 (0.2)
D	.006 (0.1)	.278 (2.9)*	.203 (3.1)**
R ²	.457	.184	.349
N	573	565	568

Notes:

T = full value property tax rate in the school district in 1979-80.

GM = percentage of the district's students who scored below the state reference point on standardized 6th grade mathematics exam in 1979-80.

AS = average of the percentages of the district's students who fell below the state reference point on standardized 3rd and 6th grade reading and mathematics exams in 1979-80.

D = 1 = city school district (school board sets tax rate), 0 = other school district (voters approve school budget in annual referendum).

Sources: Authors' calculations from:

(1) LVAL to PURB—defined as before (see Table 1).

(2) T, D—New York State Education Department, "Financial Data System" (ST3) School District Tape for 1979-80.

(3) GM, AS—New York State Education Department, Pupil Evaluation Program (PEP) Test Scores.

* Statistically significant at the .10 level; ** statistically significant at the .05 level (two-tailed tests).

to require remedial services, and state aid is increased to help fund these services. Since these outcome scores measure the proportion who "fail" these tests, we are focusing on the bottom tail of the academic achievement distribution.⁹

For each of these three outcomes (O), equations were estimated of the form

$$(2) \quad \log O_j = b_{0j} + b_{1j}Z + u_j \\ j = 1, 2, 3$$

where Z is a vector of school district characteristics expected to influence these outcomes and u is a random error term. In fact, the variables in (2) are assumed to be identical to those school district variables that enter the salary equation, save that a (1,0) "city school district" dummy variable replaces the continuous variable for district size. The dummy variable is included because in the large city school districts in New York State the property tax rate is set by an elected school board (subject to constitutional limitations), whereas in the smaller school districts the school budget, and hence the tax rate, is set each year by a voter referendum. One might conjecture that in the latter situation, *ceteris paribus*, direct voter control will lead to lower tax rates.

In the main, the estimates in Table 4 conform to our expectations and provide

⁹ These tests, unfortunately, were the only ones for which the New York State Education Department could give us data, since they are the only tests that all students in the state are required to take. It obviously would have been preferable to have test scores for older students and also to focus some attention on the upper tail of the achievement distribution. For example, data on high school graduation rates, or on the fraction of seniors going on to higher education, would have been desirable. Our focus on the lower tail of the elementary school student test distribution imparts additional error to our educational performance measures, as does the omission of other aspects of educational performance that are not easily measured (such as teaching students to write, or giving them a sense of social responsibility).

reasonable explanations of the tax rates and test scores. For example, with respect to tax rates, although wealthier districts (as indicated by LVAL) have lower tax rates, since the elasticity of the tax rate with respect to per capita property values is greater than minus one, they raise more revenue to finance education. Similarly, higher tax rates are found in districts that are relatively well off in terms of current income (LY2); districts with high proportions of nonwhites (PNW), and thus special needs; districts with high proportions of adults with more than a bachelor's degree (PHED), who presumably have a taste for education; and districts in which a relatively high percentage of households have children at home (PCHL), and where spending on education is thus valued more highly relative to keeping taxes down.¹⁰

Similarly, wealthy districts, districts with high current income, and districts with highly educated adults, *ceteris paribus*, all have lower failure rates on the academic tests than other districts, and districts with a higher proportion of nonwhites have higher failure rates. Failure rates, but not tax rates, also appear to be higher in the "city" school districts. It is worth noting that the equation used to predict the average test failure rate "fits" much better than the equation used to predict the sixth grade math test failure rate. Although it would be preferable to use the former in our analysis, only the latter can be used in an analysis that exploits the longitudinal nature of the data (see footnote 9, above).

Given these estimated coefficients (cor-

responding to \hat{b}_{0j} and \hat{b}_{1j} in equation 2), one can obtain estimated values of the logarithm of each outcome for each school district (i) from

$$(3) \quad \widehat{\log O_{ji}} = \hat{b}_{0j} + \hat{b}_{1j} Z_i \\ j = 1, 2, \dots, 3.$$

The school district's performance is then defined as the difference between the predicted and actual values of the log of each outcome.¹¹

$$(4) \quad P_{ji} = \widehat{\log O_{ji}} - \log O_{ji} \\ j = 1, 2, \dots, 3.$$

Positive values of P_{ji} indicate positive performance for the district, since positive values would occur only when predicted tax rates (or predicted failure rates on tests) exceed actual tax rates (or actual failure rates on tests) in the school district.

It is worth reemphasizing that equations (2), (3), and (4) are estimated separately each year. Thus, the structural equations that generate the performance measures are allowed to vary across years, as are the estimates of tax and test score performance in the district.

School District Performance and Superintendent Mobility

As noted above, each year approximately 5 percent of the sample moved to another school district in New York State. Of those, about 80 percent received salary increases and 20 percent either received the same salary or suffered salary cuts. Thus, in each year four mobility categories are observed: about 85 percent of the superintendents continued in the positions they held the previous year, about 4 percent moved to another New York State school district and received a higher salary, about 1 percent moved to another

¹⁰ A number of people have pointed out to us that in many communities businesses pay a substantial share of property taxes. Since only residents vote on school taxes, it would be desirable to include the share of property owned by residents in the total tax base as an additional explanatory variable in the tax rate equation. Our talks with officials in the New York State Education Department and Division of Equalization and Assessment indicate that (1) residential property data are not available at the school district level in New York State and (2) such data would not capture what we are after anyway, since some business property may be owned by residents and some residential (rental) property may be owned by nonresidents.

¹¹ A similar "residual approach" to estimating performance was used in Goldstein and Ehrenberg (1976) in a different context. It is a property of ordinary least squares that the computed residuals are uncorrelated with the explanatory variables in (2). Since these variables are identical to those found in the cross-section salary equation (equation 1), omission of the performance measures from (1) will not bias any of the other coefficients in that equation.

New York State school district and received either the same salary they had before or a reduced salary, and about 10 percent dropped out of the sample. What factors determine in which of the four classes a superintendent wound up in each year?

To econometrically model this joint wage change-job change-sample exit process would be extraordinarily complex, since both school boards and superintendents are involved in the relevant decision process. The ideal procedure would be to estimate a complete structural "matching model" that contains both employer (school board) and employee (school superintendent) decision rules. Given the limited data we have, however, we instead estimated simpler reduced form models of the form

$$(5) \quad \log \left(\frac{P(\text{state} = j)}{P(\text{state} = 4)} \right) = d_{0j} + d_{1j}Y + d_{2j}S + d_{3j}T + d_{4j}E + \epsilon_j$$

$$j = 1, 2, 3$$

where Y is a vector of characteristics of the school district (a subset of the X in equation 1), S is the vector of superintendent characteristics, and T and E are the relevant tax rate and educational test score performance measures. The notation $P(\text{state} = j)$ denotes the probability that an individual is in state j , with the four states being continuing in the same district, moving to a new district with a salary increase, moving to a new district with the same or a lower salary, and exiting from the sample. Under suitable assumptions about the distribution of the error terms (i.e., that it is logistic), the system in equation (5) represents a multinomial logit model and can be estimated by standard maximum likelihood methods.

What are the relevant tax rate and educational test score performance measures to use in this analysis? On the one hand, one might argue that the relevant measures would involve *changes* in performance over time. That is, a superintendent's mobility probabilities might be influenced by whether his school district's

tax rate and test score performance measures had improved or worsened over time. On the other hand, one might argue that keeping test score and tax rate performance at a constant but high (low) level might lead to higher probabilities of moving to a higher- (lower-) paying job. We investigate the empirical question of whether a *change* in performance measure or a *level* of performance measure is more useful by experimenting with various specifications.

If measures of performance *level* are used, it is important to recognize that data on performance in one district are not always immediately available to other districts for comparative purposes for use in hiring and firing and compensation decisions. For example, suppose we are looking at potential mobility between 1979-80 (the base year) and 1980-81 (the new year). The base year math test (for 1979-80) was given in the spring of 1980, and a district may have received its own test results back shortly thereafter. There is little chance, however, that it received data on the test scores in other districts in the state before the beginning of the next academic year (the fall of 1980). Such information would thus come too late to be used to estimate test score performance indexes that could then be used in the decision to retain the superintendent for 1980-81 or to try to attract a superintendent from a district that had a higher test score performance index. Thus, the pertinent test score performance measure in a study of superintendent mobility between 1979-80 and 1980-81 is that for 1978-79. Below, we refer to this measure as the *lagged* year district test performance index.

Unlike comparative data on academic tests, comparative data on base year tax level performance *are* potentially available to be used in personnel decisions affecting superintendents. But even so, if the processing of such information by the decision-making body is sufficiently delayed, a lagged year tax rate performance index may again be the relevant one to use.

Table 5 presents the estimates of the specification of equation (5) that uses the

Table 5. Determinants of Superintendents' Mobility: Multinomial Logit Analysis.^a
(absolute values of t statistics in parentheses)

Variable	$P(\text{move}, \delta > 0)$	$P(\text{move}, \delta \leq 0)$	$P(\text{leave sample})$
	$P(\text{stay})$	$P(\text{stay})$	$P(\text{stay})$
C	45.263 (4.2)*	13.167 (1.0)	-5.494 (1.3)
Y81	.645 (1.8)	.071 (0.1)	.530 (2.3)*
Y82	-1.670 (2.8)*	.149 (0.2)	.054 (0.2)
MPL	-.128 (0.4)	-.448 (0.8)	-.255 (1.1)
TPL	1.466 (2.0)*	-2.006 (1.7)	-.176 (0.4)
CDEG	.050 (0.1)	-.029 (0.0)	-.194 (0.4)
DDEG	1.307 (3.0)*	.586 (0.9)	.368 (1.3)
EKPG	-.062 (1.9)	-.049 (0.8)	-.089 (3.8)*
TEN	-.014 (0.2)	.075 (1.1)	-.004 (0.1)
EXPS	.121 (3.0)*	.144 (2.2)*	-.086 (0.7)
LENR	-.009 (0.3)	.039 (0.1)	.037 (0.3)
LVAL	-.202 (0.7)	.164 (0.8)	-.164 (1.1)
LY2	-4.637 (3.9)*	-1.927 (1.4)	-.254 (0.5)

^a Also included in the analysis were dummy variables for nonreporting of age, tenure at base year job, and experience as a superintendent on previous jobs.

Number of superintendents in different mobility categories:

Total Observations	1,408
Stay	1,207
Move, $\delta > 0$	46
Move, $\delta \leq 0$	19
Leave Sample	136

Variable definitions: For most variables, see Table 1. MPL: School district math test performance measure in the lagged year in the superintendent's base year school district. TPL: School district tax rate performance measure in the lagged year in the superintendent's base year school district.

* Statistically significant at the .05 level.

lagged year performance level measures (TPL for tax rate performance, MPL for math test score performance). One striking result is that the lagged tax level performance measure (TPL) is positively associated with the odds of moving to a higher-paying job (relative to staying) and negatively associated with the odds of moving to a lower-paying job (relative to staying). Put another way, among movers the better the lagged tax level performance is, the more likely the individual will move to a better job. Thus, it appears that a school district's financial performance does affect its school superintendent's future.

The math performance variable (MPL), in contrast, is always insignificant. The poor predictive power of that variable in comparison with the tax level performance variable is consistent with the questionnaire results described above.

As suggested by the cross-section results discussed above (under "Preliminary Analysis"), having a doctorate degree (CDEG) increases a superintendent's chances of

moving to a better-paying job relative to his chances of not moving. Older superintendents, as measured by years since receiving a bachelor's degree (EXPG), are less likely to move to another job and more likely to leave the sample (again, relative to staying in the same district)—findings that clearly reflect the decline of voluntary mobility and increase in retirement rates with age. Previous experience as a superintendent in other districts (EXPS) is positively associated with moves to both higher-paying and lower-paying jobs, relative to staying in the same district, a result that may well reflect heterogeneity of turnover probabilities. (See Chamberlain 1981 or Heckman 1981 for discussion of methods to distinguish heterogeneity bias from other factors.) Finally, employment in a school district with high median family income is associated with a reduced probability of moving to a higher-paying job relative to the probability of staying. As indicated in Table 1, higher-income school districts pay more than other school

districts, thereby reducing the likely gain from mobility.

The last-mentioned result raises the question of whether some measure of the superintendent's potential gain from mobility should be directly included in these equations. We experimented with four such measures: the logarithm of the superintendent's base year salary, the residual from a base year log salary equation that included only superintendents' characteristics, the residual from a base year log salary equation that included both superintendents' and school district characteristics, and the residual from a comprehensive base year log salary equation that also included performance measures. None of these measures, however, proved to be statistically significant (when they were included one at a time), nor did their inclusion affect the pattern of signs and significance of the coefficients in Table 5.

We also tested for the sensitivity of our mobility results to the specification of the performance variables. Four specifications were tested: base year level, lagged year level, both base and lagged year levels, and change between the base and new year. The results (see Ehrenberg, Chaykowski, and Ehrenberg 1986) indicate quite clearly that only the lagged level of tax performance is significant, with better performance leading to an increased (decreased) probability of moving to a position with a salary higher than (equal to or lower than) the base year salary, relative to the probability of remaining on the same job.

School District Performance and Superintendent Salary Changes

In this section we examine the question of how salary increases—both for superintendents who remain in the same district for two consecutive years and for those who move to another district in New York State—are related to the lagged year tax rate and test score performance measure in the base year school district.¹²

¹² Treating mobility as exogenous here leads to obvious potential selectivity problems: we may be

Table 6 presents estimates of two salary change equations for superintendents who remained in the sample over two consecutive years. Column (1) presents the simplest model, in which salary change is postulated to be a function only of year dummy variables and a dichotomous variable (*M*) for whether the superintendent changed jobs (1 = yes, 0 = no) during the period. The results in this column suggest that mobility mattered; on average, superintendents who changed jobs received salary increases that were 6 percent higher than those who remained in the same position. It does not follow, however, that mobility always pays. In fact, as noted above, approximately one-fifth of the movers each year failed to increase their salaries; some of these suffered salary losses as large as 30 percent.

Column (2) presents the results of estimating a model in which a superintendent's salary change is also postulated to be a function of the lagged tax rate and math test score performance measures in the superintendent's base year school district, as well as the differences between the base year district and new year district in the logarithms of county income, school district enrollment, and school district full value of property per student. (For stayers, the values calculated are simply the within-district changes in the variables between the base and new years.) The coefficients of each of these change variables and the performance measures were allowed to differ between movers and stayers in this model.

The major result of this specification is the finding that, *ceteris paribus*, movers suffer salary losses in the range of 5 to 6

confounding the effect of the performance variables on mobility prospects with their effects on salary changes given mobility status. But in the absence of a well-specified structural model of the mobility process that takes account of both school board and superintendent decision rules (see the discussion headed "School District Performance and Superintendent Mobility," above), any attempt to use the estimates in Table 5 to obtain a Heckman (1979)-type "selectivity correction" term to add to the mobility equations would be ad hoc at best and subject to specification error. We do not attempt such corrections here.

Table 6. Salary Change Equations for Superintendents Who Stayed in the Same Position or Moved to Another Position in New York State. (absolute values of t statistics in parentheses)

Variable	(1)	(2)
C	.061 (37.9)*	.079 (8.7)*
Y81	.020 (7.3)*	.010 (3.0)*
Y82	.006 (2.3)*	-.004 (0.8)
M	.060 (10.0)*	-.055 (4.4)*
ΔLY1		-.110 (1.4)
ΔLENR		-.004 (0.1)
ΔLVAL		.003 (0.5)
MPL		.007 (2.5)*
TPL		.008 (1.3)
M*ΔLY1		.425 (5.0)*
M*ΔLENR		.105 (2.6)*
M*ΔLVAL		.052 (4.1)*
M*MPL		-.038 ^a (2.8)*
M*TPL		.067 ^a (2.2)*
N	2,208	1,210
R ²	.066	.322

^a Implied marginal effects of lagged year performance variables on movers' salary changes: TPL = .075(2.5), MPL = .032(2.5).

Explanations:

- Y81 Dummy variable equal to one if the 1980-81 and 1981-82 observations differed, zero otherwise.
- Y82 Dummy variable equal to one if the 1981-82 and 1982-83 observations differed, zero otherwise.
- M Dummy variable equal to one if the superintendent moved to another superintendency in New York State, zero if he remained in the same school district.
- ΔLY1 The logarithm of per capita personal income in the county in which the superintendent's school district was located in the new year minus the logarithm of per capita personal income in the county in which his school district was located in the base year.
- ΔLENR The logarithm of total enrollment in the superintendent's school district in the new year minus the logarithm of total enrollment in his school district in the base year.
- ΔLVAL The logarithm of the full value of property per enrolled student in the superintendent's school district in the new year minus the logarithm of the full value of property per enrolled student in his school district in the base year.
- MPL, TPL Math test and tax rate performance measures in the lagged year in the superintendent's base year school district.

* Statistically significant at the .05 level (two-tailed test).

percent relative to stayers. Changes in these variables, however, are positively associated with salary changes for movers but *not* for stayers. Hence, in order for superintendents to gain from mobility, they must move to either higher-income, larger, or wealthier school districts. This result is fully consistent with the cross-section salary equations presented in Table 2.

The coefficient on the lagged math test performance variable suggests that superintendents who are "stayers" in school districts with above-average math test performance receive larger salary increases than other superintendents who do not change jobs. Tax rate performance appears also to be positively associated with the salary increases of stayers, but the coefficient on that variable is not significant.

The evidence on the effects of performance on the salary changes of superintendents who change jobs is a bit more mixed. The derived estimates (from the stayer and interaction coefficients) of the effects of performance on movers' salary changes are found in the note to the table. Although lagged tax performance in the base year school district is positively associated with earnings gains for superintendents who change jobs, the association with lagged math test performance is negative. We have no explanation for the latter finding, which conflicts with the other results reported here and in the previous section.¹³

Superintendents' Influence on School District Performance

Two presumptions of our paper are that school superintendents can affect our measures of school district performance

¹³ As in the previous section, inclusion of the superintendent's salary in the base year as an additional explanatory variable did not alter any of the other coefficients. For the subset of school districts for which we had teacher salary data, we also attempted to test if school superintendents' salary changes were related to the salary changes of teachers in their school district. This variable, however, never proved statistically significant.

and that the provision of appropriate financial incentives will encourage them to do so. In this section we investigate the validity of the first presumption. One simple way to test whether superintendents *have* had any effect on our measures of school district performance is to assume that

$$(6) \quad P_{it} = \sum_{j=1}^n a_j d_j + \sum_{k=1}^m b_k I_{kt-1} + \epsilon_{it}$$

where P_{it} is an estimated performance measure (either test score or tax rate) for school district i in year t , d_j is a dichotomous variable equal to one if the particular school district is district j and zero otherwise, n is the number of school districts in the sample (approximately 700), I_{kt-1} is a dichotomous variable equal to one if superintendent k worked in school district i in year $t-1$ and zero otherwise, and m is the number of superintendents in the sample (approximately 1,000).

Equation (6) is a simple analysis of variance model in which a school district's estimated performance measure in a year is specified to depend only on the district and the particular superintendent employed in the district in the previous year.¹⁴ If superintendents *per se* matter, at least some of the b_k should prove to be nonzero.

Conceptually simple though it is, however, equation (6) entails estimating a model with approximately 1,700 coefficients, no simple computational task. Fortunately, first-differencing yields

$$(7) \quad P_{it} - P_{it-1} = \sum_{k=1}^m b_k (I_{kt-1} - I_{kt-2}) + (\epsilon_{it} - \epsilon_{it-1}).$$

That is, the change in a performance

index in a school district between year t and year $t-1$ will be a function of the change in all of the superintendent variables. If the same superintendent was in the school district in years $t-1$ and $t-2$, the changes in all these superintendent variables will equal zero. If a change in the superintendent occurred, one variable will equal one and one variable will equal minus one for the district.

The majority of superintendents in our sample stayed in the same school district throughout the sample period; for these people, $I_{kt-1} - I_{kt-2}$ always equaled zero, and thus their "variables" dropped out of the model. In practice, using performance data for $t = 79-80, 80-81,$ and $81-82$ and superintendent data for $t-1 = 78-79, 79-80,$ and $80-81$ left us with roughly 1,000 "change observations" and 125 coefficients to estimate in equation (7).¹⁵ A simple F test of the hypothesis that each coefficient of the vector of b_k coefficients equals zero is then a test of whether superintendents *per se* influence the school district performance measures.

Both the tax rate and sixth grade math test performance measures were used in the estimation, and in neither case could we reject the null hypothesis that each b_k was equal to zero. That is, we found no evidence that knowledge of who the school superintendent was in one year can help in predicting a school district's tax rate performance measure or its sixth grade math test score performance measure in the following year. Thus, superintendents do not appear to have influenced our measures of school district performance.

Of course, a more complete analysis would experiment with a variety of different lags in equation (6) using larger

¹⁴ The one-year lag is assumed in the case of the tax rate measure because the tax rate in year t is determined by the school board and superintendent in year $t-1$. Although test scores in year t conceivably could depend on the superintendents' actions in year t , a year lag seems reasonable in this case as well. Longer panels of data than we have would permit experimentation with a variety of lag lengths.

¹⁵ Our sample spans the 1978-79 to 1982-83 academic years. We have only three years' performance data to use here because (1) the 1978-79 measures cannot be used, since we do not know who the superintendent was in 1977-78, and (2) we never computed the 1982-83 measures, since, in the absence of 1983-84 data on superintendents' salaries and job locations, they were not used in the analyses in previous sections.

sample sizes (more years' data).¹⁶ In addition, the weakness of our educational performance measures should be reemphasized. Data limitations have restricted us throughout our analysis to focusing on the lower tail of the achievement distribution in mathematics for one elementary grade level. More complete measures would focus attention on the upper tail, on other subjects, on achievement measures for older students (such as test scores, drop-out rates, high school graduation rates, and college attendance rates), and on variables that are less easily measured (such as the success with which students are taught to think critically or instilled with a sense of social responsibility). Clearly, the measure we use as an index of educational performance is measured with considerable error. It is therefore quite possible that we understate both superintendents' effects on educational performance and the effect of educational performance on superintendents' salary changes and mobility.

Concluding Remarks

Are school superintendents rewarded for their school districts' good performance by larger salary increases or greater opportunities for mobility to higher-paying positions? Although the evidence we have presented is somewhat ambiguous, our tentative answer is yes. The better a school district's tax rate performance measure, other things equal, the more likely that its superintendent will move to a higher-paying job the following year; and among "movers," the better the district's tax rate performance measure, the higher the new salary is likely to be. Also, the better the district's sixth grade mathematics test performance in the previous year, the larger are the salary increases for "stayers." Contrary to our expectations, however, this educational

performance index is negatively associated with salary increases for movers—a finding that gives us some pause as we draw conclusions.

Another important question is whether the rewards superintendents apparently receive for good performance by their districts (on the two measures we use) are great enough to induce them to work harder to improve that performance. Our study does not directly address that question, but judging by the quite modest effects we have found, as well as by the responses to the questionnaire item on the criteria school boards use in their evaluation of superintendents, we would be surprised if the answer were yes.

For example, the estimated coefficients in Table 6 suggest that a superintendent who remained in the same district while his district's math test performance index held steady at one standard deviation above the mean performance index (which is zero) would receive an annual salary increase only 0.3 percentage points higher than that awarded a superintendent who remained in a district with only average performance on the same measure.¹⁷ If the two districts maintained these levels of performance over a ten-year period, the salaries of the superintendents would diverge by only slightly more than 3 percentage points. Similarly, among superintendents who moved to another position, those whose districts' tax rate performance index was one standard deviation above the mean tax rate performance (which again is zero) would receive a salary increase upon moving only 1.7 percentage points higher than the salary increase given a "mean performing mover."¹⁸ In neither case does the incentive seem strong enough to elicit much extra effort from a superintendent to improve his school district's performance.

¹⁷ This increase is computed as the stayer coefficient for the lagged math performance variable (.007) multiplied by the standard deviation of the math performance variable (.46).

¹⁸ This increase is computed as the implied mover coefficient for the lagged tax rate performance variable (.075) multiplied by the standard deviation of the tax rate performance variable (.23).

¹⁶ For example, we found similar results (no apparent effect of school superintendents on school district performance) when we assumed that performance in period t was a function of the superintendent in period $t - 2$.

On the other hand, the coefficients in Table 5 do suggest that a district's tax rate performance substantially influences its superintendent's prospects for mobility. Specifically, the probability of moving to a better-paying superintendency in New York State relative to the probability of remaining in the same district was 40 percent higher—and the probability of moving to a new superintendency paying less or no more than the original position relative to the probability of remaining in the same district was 37 percent lower—for a superintendent whose district's tax rate performance was one standard deviation above the mean than for a superintendent whose district's performance was only at the mean.¹⁹ Given the small number of superintendents who moved to new superintendencies in New York State, however, the ratios of these probabilities on average are so small—.098 (46/1207) and .016 (19/1207), respectively—that it seems unlikely that these mobility effects are large enough to provide appropriate incentives for superintendents to improve their districts' tax rate performance.

Our finding that the identity of a district's superintendent had no apparent connection with the values of our two performance measures for that district is open to several interpretations. First, it may be that the incentive effects we have estimated are too weak to induce superintendents to try to influence these performance measures. Second, it is possible that

¹⁹ These effects are calculated as $\exp((1.466)(.23))$ minus one and $\exp((-2.006)(.23))$ minus one, respectively.

school superintendents actually have little control over their districts' tax rates or educational performance. Contradicting this interpretation, however, is that portion of the effective schools literature (see footnote 1, above) that emphasizes the important roles school administrators play. Third, as noted above, the shortness of the time covered by the available data and errors in the measurement of our educational performance indexes may have resulted in our underestimating both superintendents' effects on school district performance and the effects of school district performance on superintendents' salary changes and mobility.

Identifying the correct explanation for the apparent irrelevance of superintendents' identity to the two measures of school performance we use will require additional research, some suggestions for which we have briefly discussed in this paper. Which (if any) of the interpretations mentioned above proves to be correct will surely be of interest to anyone who regards high educational performance and effective fiscal management as desirable goals for school districts. Clearly, it is too soon to state any firm policy recommendation. We are inclined, however, to take the results of both our econometric research and our survey findings at face value (that is, to accept, for the time being, the first interpretation) and to suggest to local school boards that they give consideration to building more incentives into school superintendents' compensation arrangements to encourage actions to influence educational quality and fiscal management.

REFERENCES

- American Association of School Administrators
1979— *Who's Who in Educational Administration*. Arlington, Va.
80
- Chamberlain, G.
1981 "On the Use of Panel Data." In J. Heckman and B. Singer, eds., *The Analysis of Longitudinal Labor Market Data*. New York: Academic Press.
- Ehrenberg, Ronald G., Richard P. Chaykowski, and Randy A. Ehrenberg
1986 "Merit Pay for School Superintendents?" Cambridge, Mass.: National Bureau of Economic Research Working Paper No. 1954.
- Goldstein, Gerald, and Ronald Ehrenberg
1976 "Executive Compensation in Municipalities." *Southern Economic Journal*, Vol. 43, No. 3, pp. 937-47.

Griliches, Zvi

- 1977 "Estimating the Returns to Schooling: Some Econometric Problems." *Econometrica*, Vol. 45, No. 1, pp. 1-22.

Hausman, Jerry

- 1978 "Specification Tests in Econometrics." *Econometrica*, Vol. 46, No. 6, pp. 125-71.

Heckman, James

- 1981 "Heterogeneity and State Dependence." In S. Rosen, ed., *Studies in Labor Markets*. Chicago: University of Chicago Press.

- 1979 "Sample Bias as a Specification Error." *Econometrica*, Vol. 47, No. 1, pp. 153-62.

Maddala, G. S.

- 1983 *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge, England: Cambridge University Press.

- 1977 *Econometrics*. New York: McGraw-Hill.

March, James G., and James G. March

- 1977 "Almost Random Careers: The Wisconsin School Superintendency, 1940-72." *Administrative Science Quarterly*, Vol. 22, No. 3, pp. 377-409.

Mundlak, Yair

- 1978 "On the Pooling of Time-Series and Cross-Section Data." *Econometrica*, Vol. 46, No. 1, pp. 69-85.

National Commission on Excellence in Education

- 1983 *A Nation at Risk: The Imperative for Educational Reform*. Washington, D.C.

Schmittlein, David, and Donald Morrison

- 1981 "On Individual Level Inference in Job Duration Research: A Reexamination of the Wisconsin School Superintendents Study." *Administrative Science Quarterly*, Vol. 26, No. 1, pp. 84-89.