Wage Determination in Public Schools and
The Effects of Unionization

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Presented at the Conference on Labor in Non-Profit Industry and Government, May 7-8, 1973
Sponsored by: Industrial Relations Section, Princeton University, Office of Research and Development, Manpower Administration, U.S. Dept. of Labor.
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The increasing militancy of organized teachers confronts school administrators and other public officials with serious questions. Some estimate of the impact of collective bargaining on teachers' wages would appear to be mandatory for any serious educational planning. To determine whether collective bargaining has raised teachers' wages requires an explicit theory of the determination of wages and employment in school districts. In section I a formal model of wage determination in public education is presented. In section II the sources of data required for an empirical test of the model are reviewed. In section III statistical results which tend to confirm the model are presented, along with a number of interesting implications derived from the regression estimates. In most of what follows, equations and mathematical notation serve mainly to summarize what is primarily a verbal exposition.

I. A Model of the Salary Decisions of Local School Boards

Elements of a Theory

An Educational Quality Index

Data regularly published by teachers' associations, state departments of education, and other organizations, indicate that professional educators are vitally concerned with teacher-student ratios, the teaching experience of the average faculty member, and the proportion of a faculty holding
various kinds of certification, among other things. Although teachers' associations may view the teacher-student ratio as an index of working conditions, they, along with school boards, write about the ratio as though it were one component of an index of the educational quality of a school system. Similarly, the great concern for experience and certification is consistent with the hypothesis that these are viewed as determinants of educational quality.1

We assume, then, that school boards consider educational quality to depend upon the teacher-student ratio and the caliber of the faculty. For simplicity, we shall consider only two characteristics that define the "caliber" of the faculty: experience indicates the years of teaching of the average teacher; ability indicates any attributes other than experience that the school board believes are important. Ability is assumed to be an economic good.2 We write the quality index, which represents the subjective views of the school board, as

\[ Q = H(T/S)^a q(A, X) \]  

where a definition of all the variables is given in Table 1, where a is a parameter which is less than one in value, and where q indicates some unspecified function. In other words, the equation states that educational quality, Q, is believed to depend upon the teacher-student ratio, T/S, the average ability of the faculty, A, the average experience of the faculty, X, and whether the school system is an elementary system or comprehensive system, H. The equation does not indicate whether ability and experience interact with each other in producing educational quality. However, the relationship between the teacher-student ratio and the other two inputs is multiplicative, since it is meaningless to speak of ability or experience contributing to educational
### Table 1

**Abbreviations and Definitions of Variables**

**Endogenous Variables**

<table>
<thead>
<tr>
<th>B</th>
<th>Base pay. The salary for an academic year of a teacher with no previous experience who holds the bachelor's degree or equivalent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Increment in salary per year of experience. The average salary increment per year of experience up to some maximum level of experience.</td>
</tr>
<tr>
<td>A</td>
<td>Ability of the average faculty member. A set of capabilities believed by the school board to contribute to educational quality.</td>
</tr>
<tr>
<td>X</td>
<td>Experience of the average faculty member. Attribute believed to contribute to educational quality.</td>
</tr>
<tr>
<td>T</td>
<td>Number of teachers in the district.</td>
</tr>
<tr>
<td>Q</td>
<td>Educational quality.</td>
</tr>
</tbody>
</table>

**Exogenous Variables**

| H | A variable indicating whether a school district administers high schools as well as elementary schools. |
| WA | Alternative wage. The wage available to teachers in alternative employment. |
| AN | Amenities. The presence of pleasant working conditions. |
| TXB | Tax base. The equalized property value per pupil in the district. |
| INC | Median family income of a community. |
| S | The number of pupils in average daily attendance in the district. |
quality if there are no teachers available. Ability and experience are embodied in teachers, and our equation makes this apparent. The variable H simply recognizes the fact that a teacher-student ratio considered "good" in an elementary system might not be good in a high school. Equation (1) purposely ignores non-personnel factors such as the age or condition of school buildings.

The reason we focus on average ability rather than the ability of various categories of teachers is because the school board has at its disposal tools capable of influencing only average ability. The single salary schedule essentially prevents school administrators from offering very high salaries to certain particularly capable teachers, despite a few dodges that may be used to get around a strict application of the schedule. Rather than tailoring its offers to the individual candidates for employment, the board must set a schedule of wages applicable to everyone and make a choice from among the candidates who make themselves available at those rates. Thus, with such a general tool at its disposal, the board is likely to set appropriately general goals: the attainment of some average level of ability and experience.

Supply of Ability and Experience

If a school district wishes to improve its capacity to recruit and hold highly able teachers, it must increase its salary schedule relative to that of alternative occupations. Recruiting power is probably improved most readily by increasing base pay. Base pay is important because most teachers actively seeking employment are now graduates, and in any event base pay has an impact on other pay grades as well. Perry and Wildman (1970, p.151)
support this estimate of the primary importance of base pay in recruiting when they state, "the primary link between the school system and the labor market tends to be at the base of the service dimension and of the salary schedule." This is also the view of Benson (1968, p. 304).

Equation (2) incorporates this view, and indicates the level of base pay required for the school district to recruit and hold a faculty of some level of ability:

$$ B = u(A; AW, AM). \quad (2) $$

Equation (2) does not indicate that base pay must increase as the number of teachers increases. The assumption implicit in this is that the elasticity of supply of teachers of given ability to a district is infinite. This view would be contested by Landon and Baird (1971) with respect to certain especially large school districts, but it is probably a very good assumption for most school districts.

Equation (2) indicates that the wage available to teachers in alternative work, $AW$, determines the base pay that must be paid to obtain teachers of some given level of ability. If the alternative wage increases, then, ceteris paribus, the base pay must increase. Should the base pay fail to increase in response to an increase in the alternative wage, the district would experience a deterioration in the ability of its faculty. In the long run, when all economic resources are fully mobile, the elasticity of teachers' wages with respect to the alternative wage should be one. Any wage differential not justified by hours of work, required training, or amenities, would be eliminated.
Equation (2) also explains the scarcity value \( y \), of teaching in certain school districts. We are not concerned with the non-salary benefits associated with year teaching job (e.g., salary vacation, hours coinciding with those of one's children, etc.). The variable \( y \) distinguishes differences in amenities among districts; unpleasant work may command high wages.²

Just as a certain level of base pay allows the district to influence the average ability of its faculty, so the district is able to reduce turnover and increase the average level of experience by rewarding experience more highly:

\[
I = I(X; \alpha, \beta).
\]

(3)

The Demand for Educational Quality

We assume that a community (or a majority of its voters) assigns some dollar value to the educational quality produced by its school system. An egalitarian community may do so in the following manner. For the typical, or average, child, educational quality of level \( Q_i \) is believed to have some value \( K_i \). That is, there is a function \( K \) that gives the dollar value per child for every possible level of educational quality. We assume that the value of a marginal improvement in educational quality is always positive, but decreasing in value over the relevant range. The total value of educational quality (TVEQ) is defined as the value to a typical student multiplied by the total number of students,

\[
TVEQ = S \cdot K(Q; \text{INC, TXB}),
\]

(4)

where, as you recall, \( \text{INC} \) indicates community income, and \( \text{TXB} \) indicates the tax base of the community. The function \( K \) may be interpreted as showing the
maximum amount that the community will bid per child to obtain some level of educational quality.

The tax base, TAX, and level of income in the community, INC, also help determine what the community will bid to obtain educational quality. If education were simply an investment in productive skills, then tax base and income would have no impact on the willingness of the community to buy extra educational quality. That is, community income or tax base would not cause the demand curve of the community for educational quality to shift. Any rational community—rich or poor—would simply value an increment of educational quality at the present value of the anticipated future earnings of the students attributable to that increment; the present value of educational quality, not the ability to pay for it, would determine the demand curve for educational quality.

Education, however, is not merely a producer's durable investment; it is also a consumption good. If education is at least partially a consumption good then the theory of the consumer tells us that income and tax base should have an impact on the demand curve for educational quality. Equation (4) reflects the view that education is at least partially a consumer's good. Thus, as community income and tax base grow, the demand for educational quality (i.e., TVEQ) increases.

Total Salary Costs

The total salary cost (TSC) to the district is defined as the average salary multiplied by the number of teachers:

\[ TSC = T(h + XI) \] (5)
Clearly, the total salary cost will rise if the school board attempts to increase educational quality in the district.

**Objectives of the School Board**

Among the plausible objectives of a school board are the following:

a) maximize educational quality, as long as total cost of the quality does not exceed the total value of educational quality as perceived by the community;

b) minimize costs, as long as some acceptable minimum level of quality is maintained;

c) maximize the "surplus" of the value of educational quality above its costs of production.

Objective (a) is unlikely. The assumption of diminishing marginal value of quality means that the last few units of quality produced in maximizing quality would be viewed by the community as costing more than they were worth. Why would a community that is cognizant of both the value and cost of educational quality (as we have assumed) adopt (or stick with) a goal which results in the production of educational quality that costs more than it is worth?

Hidden agendas, of course, may exist, prompting some school boards to adopt this goal. For example, the board may gain prestige by producing more educational quality than the citizens want. Or, school boards may be pressured by their professional administrators whose hidden agenda is to maximize quality because that results in maximized employment of teachers, which enlarges the supervising responsibilities of administrators and possibly administrators' salaries. Our assumption, that the community is aware of the value and cost of educational quality, suggests that such hidden agendas would soon be discovered and defeated.
Objective (b) is similarly unlikely, for reasons already suggested. So long as a community perceives the value of marginal increases in educational quality to exceed the cost, it will resist stopping at some minimum level of educational quality.

The school board will adopt objective (c) for the very reasons that it rejects objectives (a) and (b). The reader will note that objective (c), the maximization of the (positive) difference between the value of educational quality and the cost of educational quality, is analogous to profit maximization in the standard theory of the firm. When we put objective (c) in mathematical format, we have:

\[
\text{Maximize: } G = S \cdot X - T(B + XI), \tag{6}
\]

with respect to ability, experience, and the number of teachers—all factors under the control of the school board. The first order conditions require that the partial derivatives of \( G \) with respect to \( A, X, \) and \( T \) be zero. Or, in the terminology of the theory of the firm, we require that the value of the marginal quality (product) of each factor be equal to the marginal cost of each factor:

\[
\begin{align*}
VMQ(P)_A &= HS^{1-x}T^{n-1}(\partial K/\partial q)(\partial q/\partial A) = T(\partial B/\partial A) = MC_A \\
VMQ(P)_X &= HS^{1-x}T^{n-1}(\partial K/\partial q)(\partial q/\partial X) = T(\partial B/\partial X \cdot X + T) \cdot q = MC_X \\
VMQ(P)_T &= aHS^{1-x}T^{n-1}(\partial K/\partial q)(q) = B + XI = MC_T
\end{align*}
\]
These three conditions for a maximum are three equations in three unknowns. We may use equations (2) and (3) together with the solution values for $\pi$, $\lambda$ and $I$ to solve for the equilibrium values of base pay, $B$, and the experience increments, $I$.

**Interpretation of the Model and Results**

In each of the first-order equations, the first term is simply the amount that the community is willing to pay for the educational quality produced by a marginal increase in ability, experience, or number of teachers. Each term on the right-hand side of the equations is the marginal cost of an input. We note that the marginal cost of teachers, in the long run, is simply the average salary.

That the value of the marginal product of a factor should equal the marginal cost of the factor is a standard result of the theory of the firm. However, not the marginal cost of ability (or experience) is a fixed, parametric price; the marginal cost of ability varies as the size of the faculty varies. To help understand this, consider two school districts, one with a faculty of 100 teachers, the other with a faculty of 200. Both districts are assumed able, in the long run, to raise the average level of ability of their faculties by one unit if salaries are raised by $100 per teacher. Although the per-teacher cost of an added unit of ability is the same for both districts, the marginal cost for the smaller district will be $10,000 ($ = $100 \times 100$ teachers), and for the larger district will be $20,000 ($ = $100 \times 200$ teachers). The marginal cost of ability (and experience) is proportional to the number of teachers in the faculty. This should be helpful in understanding the following discussion.
One useful variation of the standard marginal conditions is that the ratio of the marginal costs of two inputs be equal to the ratio of their marginal products. Let us consider these ratios for the pair of inputs ability and teachers. Dividing equation (7) by (9) gives, after all cancellations and transformations:

\[
\frac{MP_A}{MP_T} = \frac{T(2q/\partial q)}{q(q)} = \frac{T(3B/\partial B)}{B+XI} = \frac{MC_A}{MC_T}
\]  

(10)

We note that \( T \) appears in the numerator on both sides of the equation, and nowhere else. This means that once in equilibrium the school board will continue to be on its equilibrium "expansion path" simply by increasing or decreasing the number of teachers. A similar result would be obtained by dividing equation (8) by equation (9). A diagrammatic exposition of this result is given in Figure 1.

Figure 1

[Diagram showing the relationship between teachers, ability, and an expansion path.]

Note: Explanation appears in text.
Figure 1 concentrates on the marginal conditions holding between the number of teachers and the average ability of faculty. The locus of all combinations of inputs creating equal levels of quality is called in the diagram an "isoqual" because of its obvious similarity to an isoquant in the theory of the firm. The slope of an "isoqual" at any given point represents the ratio of the marginal (quality) product of ability to the marginal (quality) product of another teacher. The total cost function allows us to find the locus of all combinations of ability and faculty size that may be obtained at a given cost. Since the trade-off between number of teachers and ability of faculty need not be at a constant rate of exchange, we have drawn two "budget lines" that are somewhat bowed. The slope at any point on these "budget lines," or "ability-teacher frontiers," represents the ratio of the marginal quality product of ability to the marginal quality product of a teacher.

Figure 1 indicates that if there were a possible equilibrium at point A, then there would be another at point 2, which lies on a vertical line through A. The equilibrium point actually chosen by a community will depend on the value it places upon educational quality. This discussion allows us to present the following formal results with a minimum of discussion.

Result 1

Starting from equilibrium, an increase in the community's tax base or community income results only in an increase of the teacher-student ratio, and no change of ability or experience of the faculty. Thus, an increase of community income or tax base has no impact on wages paid.

A formal proof will not be presented. In Figure 1, we see that an increase in the demand for educational quality (due to an increase in tax base) would
move the school district from an equilibrium at a point like A, to a point like B. More teachers, not more able teachers, are employed at point B.

The practical implications of Result I are important. Poor school districts apparently should pay about the same level of salaries as rich school districts, all else equal. Wealth per se does not result in suburban districts out-bidding inner cities for more capable or more experienced teachers. Rather we predict that wealth is spent on better teacher-student ratios.

Result II

Whether a school district administers elementary schools only, or both elementary and high schools, the salary schedule should be the same.

This result holds for the same reason that Result I holds. That is, the presence of a high school or its absence, in this model, is handled mathematically the same way a difference in tax base or community income is treated.

Result III

The salaries of teachers vary as the alternative wage varies. That is, the labor market in which a district is located has only important impact on teachers' salaries. (The main exception is that amenities or disamenities may influence salaries.)

Results I and II have eliminated any other possible influences on salaries of teachers in non-unionized school districts.

The Theory and Collective Bargaining

Although it is not a model of collective bargaining per se, the theory just presented helps us to understand collective bargaining in education.
Collective bargaining may be viewed as a process whereby variables that were once under the unilateral control of a school board become determined by an external process. A successful union sets the salary schedule higher than it would have been set by the school board in the absence of bargaining.

Exogenously determined wages, $\bar{W}$ and $\bar{T}$, would, via equations (2) and (3), determine the ability and experience of the faculty. The school board would be left with unilateral control over only the size of the faculty. That is, if the school board still adheres to the same objective, the only first-order equation would be equation (9). It can be seen from equation (9) that if $\bar{W}$ and $\bar{T}$ are larger than they would have been without collective bargaining, then the number of teachers hired will be smaller.

Does equation (9) give any insights into the magnitude of the elasticity of employment with respect to wage? Although an inelastic demand for labor is not a sufficient condition for a union's success, it is certainly a necessary condition. Equation (9) elucidates in a new way at least one of Marshall's four conditions bearing on the elasticity of demand for labor. In equation (9) the elasticity of employment with respect to wage depends crucially on the improvement of faculty ability and experience as the union raises wages. With reference to equation (9), we may set forth the following conditions determining the elasticity of demand for teachers:

1) If bargained increases in $\bar{W}$ and $\bar{T}$ above their equilibrium levels result in a relatively large increase in ability and experience, and if ability and experience are relatively potent in the production of educational quality, then, according to equation (9), the demand for teachers may well be inelastic.
2) If wage increases result in relatively small increases of ability and experience, or if ability and experience fail to play a very large role in the quality index, then the elasticity of demand for teachers may be rather large.

It is very difficult, offhand, to tell whether the demand for teachers is elastic or inelastic on the basis of this discussion, and I will not attempt to do so. Let us assume, however, that the demand is inelastic. This is a precondition for large union effects on wages. However, an inelastic demand curve for teachers' is worthless to the union if the union lacks power. "Power" means either the ability to control entry into the teaching profession, or the ability to win wage increases by imposing costs on school boards by means of strikes.

Aside from closed shops, which do not exist in public education, the power to control entry to a profession is usually through licensing. In teaching the certification process could be used to limit entry to the profession. However, in actuality, certification is controlled by state governments and the state governments have not allowed certification to restrict supply. Indeed, it is difficult to see why a government that controls certification would use it to restrict entry to a profession where the government itself is the only employer. The very fact that teachers' associations have long criticised the number of sub-standard certificates issued by state governments would seem to indicate that teachers' unions have achieved no control over the certification process.

This leaves the strike as a possible source of power for teachers' unions. It is not at all clear that the strike or threat of strike gives teachers'
unions a credible source of leverage in the bargaining situation. A union in the private sector employs the strike because it imposes costs upon profit-maximizing firms. The strike cuts off revenues while at least some of the firm's costs continue to accrue. The situation in the field of public education is notable for its dissimilarity. A school board is not a profit-maximizing institution. Furthermore, its source of revenue is not threatened by a strike. Unless the employees of the tax office are members of the teachers' unions, the revenue the school board needs to operate will be unaffected by a strike. Although state aid may be lost during a strike, the parallel with a profit-maximizing firm is tenuous and unconvincing.

The strike in public employment is obviously not a tactic designed to exert market pressure on an institution. Rather, it is a political device. The question ultimately becomes one of the political impact of strikes. Does a strike generate more support for teachers' demands than it causes antagonism against teachers? There are no a priori reasons for suggesting what the political effects of a teachers' strike will be. The issue becomes, finally, an empirical one. Table 2 presents the evidence to date regarding the impact of unions on wages in the public sector.
Table 2
The Impact of Collective Bargaining in the Public Sector

<table>
<thead>
<tr>
<th>Study</th>
<th>Type Employment</th>
<th>Wage Variable</th>
<th>Impact of Bargaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kasper (1970)</td>
<td>education</td>
<td>a) average statewide wage of teachers</td>
<td>less than 4 percent</td>
</tr>
<tr>
<td>Thornton (1971)</td>
<td>education</td>
<td>a) base pay of teachers in large cities</td>
<td>less than 4 percent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) maximum pay (M.A.) more than 25 percent in large cities</td>
<td></td>
</tr>
<tr>
<td>Landon-Baird (1972)</td>
<td>education</td>
<td>a) base pay in large cities</td>
<td>less than 5 percent</td>
</tr>
<tr>
<td>Hall-Carroll (1973)</td>
<td>elementary</td>
<td>a) mean annual salary in elementary districts in one labor market</td>
<td>less than 2 percent</td>
</tr>
<tr>
<td>Achenfelter (1971)</td>
<td>firefighting</td>
<td>a) annual salary</td>
<td>negative impact that was not statistically significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) average hourly wage</td>
<td>generally non</td>
</tr>
</tbody>
</table>
II. Testing the Model: Sources of Data

The wage equations that occupy the rest of the discussion are based upon the theory of section I. These equations were estimated using data generated by 298 school districts in New Jersey over a period of six years. Confining all observations to one state avoids relying upon published data from diverse sources that may use non-comparable definitions of the variables in question. Limiting the empirical study to one state also guarantees a uniform legal framework under which the school districts operated. All districts with more than 750 pupils in average daily attendance, except regional high school districts, were included in the sample. The six years covered by our study span several years when virtually no substantive collective bargaining occurred, and one year when active bargaining occurred in about 70 percent of all districts in the sample.

Endogenous Variables

Some of the endogenous variables in the theory, such as "ability" or "educational quality," are difficult to define, much less to quantify. Our main concern, however, is with the wages of teachers. The salary schedules of teachers are regularly published. It is permissible to ignore the undefinable variables and to treat each wage variable as a function of all the exogenous variables in the model—in essence, reduced-form estimates.

A key variable in our theory is base pay, \( B \), the annual salary received by a new teacher holding the bachelor-level degree. The level of base pay in all the school districts in our sample is published by the New Jersey Education Association in an annual series entitled New Jersey Teacher Salary Guides. This same source provided data concerning the maximum pay level for teachers holding the bachelor-level degree.
Exogenous Variables

The alternative wage, as previously defined, is a wage offered in an occupation which provides, at least in the long run, an option to employment in teaching; increases in the alternative wage ultimately force a school district to adjust its wages or allow the ability of its faculty to deteriorate. The more perfectly substitutable are teachers and workers in the alternative occupation, the less time it takes for long-run adjustments to be made. Teachers in one district are almost perfect substitutes for teachers in a neighboring district. This might suggest to the unwary that the alternative wage for teachers in district A is the wage in district B.

This prescription is seriously flawed. If the alternative wage in district A were the wage in B, then the alternative wage for teachers in B would be the wage in A. This means that a feedback loop exists and the wage in B is not really exogenous to the model. For purposes of statistical estimation it is impossible to determine the salary level in one district in terms of the salary in neighboring districts. Simultaneous equations bias would seriously hinder such an attempt. We require a truly exogenous wage.

The Bureau of Labor Statistics publishes in its Area Wage Surveys the straight-time earnings for a standard week for several occupations. The number of occupations actually surveyed varies with the labor market. Since the wages of industrial nurses were surveyed for all the labor markets of the state of New Jersey, and since nurses and teachers share some important common characteristics, this wage was chosen as the exogenous alternative wage. The nursing profession provides a good benchmark occupation because both teaching and nursing require relatively highly educated workers who are predominantly female.
The alternative wage is not the only exogenous variable that might influence the terms on which a district must hire teachers. Although we have expressed some skepticism as to the magnitude of any effect on wages (across school districts) that amenities or disamenities may have, the possibility of some amenity effect on wages clearly exists. Therefore we seek a variable to serve as a proxy for the pleasantness or unpleasantness of working in a particular district.

Our theory suggests that district size (number of pupils) per se should not influence the wages of teachers. However, district size may be a good proxy for the magnitude of the disamenities associated with a particular district. We propose the hypothesis that the unpleasantness of a job increases with the size of the district. As enrollments increase, the likelihood of racial, ethnic, or religious factions or animosities developing in the system increases. That is, all else equal, we would expect social tensions or hostilities to be more apparent in larger, rather than smaller districts. Open hostilities are much more difficult where a large proportion of teachers, parents and even pupils know one another. The tensions that develop in the largest school systems are undoubtedly disamenities. Additionally, the largest systems are responsible for a disproportionately large number of children from poverty-stricken or broken families. Some teachers may well consider the extra effort required to work successfully with these children a disamenity.

The variable actually chosen to represent the size of the district was the average daily attendance of the district. This is published by the New Jersey Department of Education in the Annual Report of the Commissioner.

Community income influences the community's demand for educational quality. Standard theory of the consumer leads us to expect that higher incomes would
lead families to be willing to pay more for educational quality, or, to buy more quality at a constant price. It is not our purpose to discuss how citizen's incomes are turned into voting behavior, and hence, into behavior by school boards. The connection between variables such as community income and the behavior of school boards is, however, discussed by authors such as Barzel (1973). Whatever the mechanism, we expect higher incomes to increase the demand for educational quality. The variable actually employed is the median family income of the community as derived from the 1960 U.S. Census, General Social and Economic Characteristics: New Jersey.

If the voters of a community and the taxpayers were exactly the same set of people, there would be little point in considering tax base in addition to median family income. A substantial number of taxpayers, however, are not voting residents. Their contributions decrease the real burden of education borne by the resident voters of the community. As property tax base per pupil rises, all else equal, we expect the demand for educational quality to increase. The equalized property value per pupil is published in the Annual Report of the Commissioner cited previously.

We also considered employing state aid as an exogenous variable influencing the demand for educational quality. Preliminary regressions state aid as a variable failed to find it significant. This was probably because during the period of our study the largest portion of state aid was in the form of flat per-pupil grants to school districts. Thus, the aid variable on a per-pupil basis would be the same for every district, and the impact of state aid would be reflected in the constant term in the regression equation.
Indirect evidence, reviewed in the next section of this paper, indicates that the small amount of equalizing aid that did exist during the latter part of our period had little impact on the wages of teachers.

The last variable is a collective bargaining dummy variable. In 1968 New Jersey enacted a public employment law. The act requires that school boards bargain with teachers' organizations that may wish to bargain. Although there had been, prior to 1968, virtually no substantive collective bargaining, local teachers' associations did exist in most districts throughout the state. Many of these local associations viewed the public employment act almost as a mandate to begin bargaining. During 1968-69 a large number of districts entered negotiations to set salaries for the academic year 1969-70. The completed contracts were filed with the Public Employment Relations Commission. A variable was constructed representing all districts with contracts on file for 1969-70. The year 1969-70 is virtually the only year in our sample permitting a cross-section analysis of the impact of bargaining. After 1968-70 there was nearly universal bargaining.

III. Empirical Results

The Base Pay of Teachers

Base pay was estimated as a function of all the exogenous variables in our model. Cross section regressions were estimated for each of the six years 1964-65 through 1969-70, with 298 observations in each. The equations for the six years were estimated by ordinary least squares and by three-stage least squares for seemingly unrelated equations; the coefficients were not substantially
changed by the method of estimation. Table 3 shows coefficients and t-statistics. Since the functional form of the equations is log-linear, the coefficients are interpreted as elasticities.

The coefficients of the tax base variable and the community income variable are extremely small. The elasticities are so small that no serious modification of our theory seems warranted. (The reader will recall that the theory in Section I predicts no impact of income or tax variables on teachers' wages.)

The skeptic may argue that community income and tax base have very low elasticities only because equalizing state aid to school districts was at work behind the scenes. If there were a large effective program of equalizing state aid, differences in community tax base and income would be more apparent than real, since the resources actually available to a district would be equalized by the state. However, for the years 1964-65 and 1965-66 there was no state equalizing aid at all; nevertheless, the estimated elasticities for those two years are not significantly different from many of the elasticities for later years, when there was a small amount of equalizing aid available.

In Table 4 we present estimates (in dollars) of the extent to which differences in tax base and community income caused variations in the base pay of teachers in New Jersey for each of the six years.

The table is very revealing: a poor district (equalized property value per pupil of $12,000) would, in 1964-65, offer as starting pay only $75 less than a rich district ($60,000 per pupil), all else equal. The practical importance of our finding, is that rich suburban districts do not seem to offer substantially more than poor urban districts.
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<td>1965-66</td>
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<tr>
<td>1970-71</td>
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<tr>
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<td>1972-73</td>
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<td>0.20</td>
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<td>0.20</td>
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<tr>
<td>1973-74</td>
<td>0.1</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
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<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Note: The table represents statistics for a specific variable and year.
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1968-69</td>
<td>Ord. Lst.</td>
<td>-7.52</td>
<td>-0.013</td>
<td>(5.5)</td>
<td>(1.0)</td>
<td>(.2)</td>
<td>(.9)</td>
<td>(.4)</td>
<td>(.0)</td>
<td>(.2)</td>
</tr>
<tr>
<td></td>
<td>Squares</td>
<td>-1.38</td>
<td>.012</td>
<td>(5.6)</td>
<td>(1.4)</td>
<td>(.7)</td>
<td>.4</td>
<td>(.2)</td>
<td>(.2)</td>
<td>(.0)</td>
</tr>
<tr>
<td>1969-70</td>
<td>Ord. Lst.</td>
<td>-7.12</td>
<td>.011</td>
<td>(3.8)</td>
<td>(1.7)</td>
<td>(.5)</td>
<td>.3</td>
<td>(.3)</td>
<td>(.1)</td>
<td>(.1)</td>
</tr>
<tr>
<td></td>
<td>Squares</td>
<td>-1.34</td>
<td>.011</td>
<td>(3.9)</td>
<td>(1.8)</td>
<td>(.5)</td>
<td>.3</td>
<td>(.3)</td>
<td>(.0)</td>
<td>(.0)</td>
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<tr>
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<td>Ord. Lst.</td>
<td>-8.00</td>
<td>.011</td>
<td>(3.3)</td>
<td>(1.3)</td>
<td>(.8)</td>
<td>.5</td>
<td>(.5)</td>
<td>(.7)</td>
<td>(.0)</td>
</tr>
<tr>
<td></td>
<td>Squares</td>
<td>-1.56</td>
<td>.011</td>
<td>(3.4)</td>
<td>(1.4)</td>
<td>(.8)</td>
<td>.9</td>
<td>(.9)</td>
<td>(.0)</td>
<td>(.0)</td>
</tr>
</tbody>
</table>

The coefficients may be interpreted as elasticities. The figures within parentheses are the t-statistics. Number of observations, each equation: 298.
Table 4.—Impact of Variations in Tax Base and Income on Base Pay, in Percent and Dollars, 1964-70.

<table>
<thead>
<tr>
<th>Year</th>
<th>Difference (%) of Tax Base between Poor and Rich Districts</th>
<th>Variation (%) of Base Pay due to Differences in Tax Base of Rich Districts</th>
<th>Variation ($) of Base Pay due to Differences in Tax Base of Rich Districts</th>
<th>Difference (%) of Comm. Income between Poor and Rich Districts</th>
<th>Variation ($) of Comm. Inc. due to Differences in Tax Base of Rich Districts</th>
<th>Variation ($) of Comm. Income due to Differences in Tax Base of Rich Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964-65</td>
<td>1.0</td>
<td>1.6</td>
<td>79</td>
<td>34</td>
<td>1.4</td>
<td>39</td>
</tr>
<tr>
<td>1965-66</td>
<td>1.1</td>
<td>1.5</td>
<td>76</td>
<td>34</td>
<td>1.4</td>
<td>72</td>
</tr>
<tr>
<td>1966-67</td>
<td>3.0</td>
<td>3.0</td>
<td>159</td>
<td>34</td>
<td>1.8</td>
<td>43</td>
</tr>
<tr>
<td>1967-68</td>
<td>3.0</td>
<td>2.0</td>
<td>114</td>
<td>34</td>
<td>3.8</td>
<td>33</td>
</tr>
<tr>
<td>1968-69</td>
<td>1.9</td>
<td>2.0</td>
<td>114</td>
<td>34</td>
<td>1.8</td>
<td>110</td>
</tr>
<tr>
<td>1969-70</td>
<td>1.0</td>
<td>2.3</td>
<td>188</td>
<td>34</td>
<td>1.7</td>
<td>114</td>
</tr>
</tbody>
</table>

Col. (1): A rich district is defined as having a tax base one standard deviation above the average tax base. A poor district has a tax base valued at one standard deviation below the mean. Col. (1) reports the geometric mean of the difference between the two as a percent of the high tax base and as a percent of the low, or poor, tax base.
Table 4. (Continued)

Col. (2): Computed by multiplying Col. (1) by the appropriate 3-stage estimate of elasticity in Table 3.

Col. (3): Computed by multiplying the decimal form of Col. (2) by the average base pay in the state for each year as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$4950</td>
<td>$5100</td>
<td>$5300</td>
<td>$5675</td>
<td>$6100</td>
<td>$6725</td>
</tr>
</tbody>
</table>

Col. (4)-(6): Computed analogously to first three columns.
Col.(3) reveals a drift toward higher differentials: from $79 in 1964 to about $188 in 1969. Part of this drift is due to larger elasticities in the later years, to be sure. Part of the drift is due, however, to the increase in magnitude of the mean base pay. Of the growth of the wage differential due to tax base differences from $79 to $188, about $50 is due to the fact that the base pay grew in magnitude over time.

Table 4 reveals that variations in community income are even less effective in explaining variations in teachers' salaries than are variations in tax base. This is because community income varies less than tax base across communities. Tax base may be altered significantly by the presence of industrial parks, summer resort property, farms, and a host of other types of real estate; indeed, in New Jersey, the communities with the largest equalized value per pupil are not "rich" suburbs, but seashore resort communities with large amounts of property relative to small permanent populations. Nor is it true that communities that have large family incomes also tend to have very large tax bases. The simple correlation coefficient of community income and tax base was less than .4. Thus, it would be wrong to suggest that the effects of income differences and tax base differences strongly reinforce each other in causing teachers' salaries to vary across districts. Property-poor districts may well have average incomes; property-rich, seashore communities certainly have below-average incomes.

Turning our attention once again to Table 3, we see that the coefficients of the alternative wage variable were much larger than of any other explanatory variable. The elasticity of base pay with respect to the alternative wage was
not one in any of these estimates, although we would expect the elasticity to be one in the long run; the cross-section estimates need not be viewed as long-run estimates. Table 5 shows the variations in base pay induced by variations in alternative wages.

Although the variation of the alternative wage from one labor market to another in any given year was rather small, it accounted for more variation in base pay than did vast variations in tax base. This strongly confirms the prediction of our theory that the labor market in which a school district is located is far more important than the wealth of the district in establishing teachers' salaries.

On a national scale the importance of labor market considerations rather than the wealth of a school district would be even more apparent. In our study, we were confined to several labor markets in a relatively small state. Thus, variation in the alternative wage was rather minor. On the other hand, variations in tax base are, in New Jersey, about as large (percentagewise) as are likely to be found anywhere: school districts in decaying core cities are juxtaposed against school districts in seashore resorts, where tens of thousands of dollars in hotel property per pupil provide an extravagant tax base. Suppose, on a national scale, the percentage variation of alternative wages were as much as 25 percent, while the variation in tax base were as much as 200 percent. Then, assuming that our coefficients were valid for the nation, we could compute Table 6.
<table>
<thead>
<tr>
<th>Year</th>
<th>Percent Variation Between Low and High Alternative Wages (a)</th>
<th>Percent Variation of Base Pay Due to Variation of Alt. Wage (a)</th>
<th>Dollar Variation of Base Pay Due to Var. of Alt. Wage (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964-65</td>
<td>4.6</td>
<td>2.5</td>
<td>124</td>
</tr>
<tr>
<td>1965-66</td>
<td>6.8</td>
<td>3.2</td>
<td>163</td>
</tr>
<tr>
<td>1966-67</td>
<td>8.1</td>
<td>2.4</td>
<td>163</td>
</tr>
<tr>
<td>1967-68</td>
<td>5.8</td>
<td>2.9</td>
<td>165</td>
</tr>
<tr>
<td>1968-69</td>
<td>4.3</td>
<td>3.2</td>
<td>195</td>
</tr>
<tr>
<td>1969-70</td>
<td>2.9</td>
<td>2.5</td>
<td>168</td>
</tr>
</tbody>
</table>

Col. (1): Series A is the percent difference between the alternative wage one standard deviation above, and one s.d. below, the average alternative wage. (Difference as a percent of mean alt. wage.)

Series B is the percent difference between the lowest and highest alternative wages in all labor markets of the state.

Col. (2): Computed by multiplying Col. (1) by the appropriate elasticity in Table 3. Three-stage estimates were employed except for 1969-70.

Col. (3): Computed by multiplying the decimal form of Col. (2) by average base pay for each year. (See note to Table 4 for average base pay.)
### Table 6

**Hypothetical Impact of Alternative Wage and Tax Base on Teachers' Base Pay**

Nationally, 1969-70

<table>
<thead>
<tr>
<th>Assumed Percent Variation of Tax. Bs. or Alt. Wg. Nationally</th>
<th>Percent Variation of Base Pay Due to Each Independent Variable</th>
<th>Dollar Variation of Base Pay Due to Each Independent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax Base</td>
<td>200</td>
<td>6</td>
</tr>
<tr>
<td>Alternative Wage</td>
<td>25</td>
<td>22</td>
</tr>
</tbody>
</table>

**Note:** assuming average base pay of $6700.
The computations for Table 6 are hardly valid as representations of the actual behavior of teachers' wages on the national level. However, they do illustrate the considerable importance of labor market variables compared to other possible determinants of teachers' wages.

We turn now to the role played by disamenities in determining the salaries of teachers. The variable serving as a proxy for the pleasantness or unpleasantness of teaching in certain districts is the size of enrollments in the district. Table 3 reveals that district size possesses a small, but significant coefficient. This tends to support the view that the variation of amenities from one district to another play only a small role in determining the base pay of teachers. Table 7 shows the impact that district size has on teachers' wages. Several representative cities have been chosen, ranging from the largest in the state to relatively modest cities.

Table 7
The Impact of District Enrollment on Base Pay, 1969-70

<table>
<thead>
<tr>
<th>City</th>
<th>Enrollment in City (1)</th>
<th>Avg. Enrl. in Surrounding County (2)</th>
<th>Percent Difference (3)</th>
<th>Percent Variation in Base Pay Due to Size (4)</th>
<th>Dollar Variation in Base Pay Due to Size (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newark</td>
<td>76,000</td>
<td>6,000</td>
<td>330</td>
<td>3.3</td>
<td>215</td>
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<tr>
<td>Jersey City</td>
<td>37,000</td>
<td>5,600</td>
<td>220</td>
<td>2.2</td>
<td>146</td>
</tr>
<tr>
<td>Camden</td>
<td>20,000</td>
<td>3,000</td>
<td>220</td>
<td>2.2</td>
<td>146</td>
</tr>
<tr>
<td>Trenton</td>
<td>17,000</td>
<td>5,666</td>
<td>115</td>
<td>1.15</td>
<td>75</td>
</tr>
</tbody>
</table>

Col. (3): Geometric mean of difference in size as percent of city's enrollment and as percent of average county enrollment.

Col. (4): Col. (3) times appropriate elasticity in Table 3.
Whether or not the figures in Table 7 represent large payments for the dis-
amenities of large-city teaching is left to the reader. Assuming a 10-month
contract, the largest monthly "disamenity premium" would appear to be about
$21--with others being considerably smaller.

Before broaching the question of the impact of unionization, we ask whether
the presence of high school teachers in a system raised the starting pay. A
variable representing the presence of a high school in the district was
included in a set of preliminary regressions. The coefficient was never
significant and positive. This is consistent with our theory.

The Impact of Collective Bargaining

For the first time in 1969-70 a number of school districts operated with
negotiated salary schedules. A dummy variable representing bargained contracts
was entered into the wage equation and failed to have a significant coefficient.
Three explanations are possible: 1) bargaining in 70% of the districts may
have influenced the 30% that did not formally file contracts; 2) bargaining
may have had no impact; 3) bargaining may have had an impact that could not
be detected by a simple dummy variable.

Collective bargaining may well interact with other determinants in
influencing the salaries of teachers. For example, "poor" school districts
may face strong political pressure to resist teachers' demands; indeed, such
pressures might actually be generated by the advent of well-publicized nego-
tiations. On the other hand, unions bargaining with "rich" districts might be
under severe pressure to achieve large gains. Thus, poor districts may bar-
gain smaller increases than when wages were quietly set unilaterally without
generating political controversy. On the other hand, rich districts may bargain larger wage increases than were set without bargaining. Bargaining may also make school boards and teachers more sensitive to prevailing labor market conditions in setting wage scales. Justifying demands and counter-proposals might force both bargaining parties to examine more closely alternative wages and market conditions than when wages were set unilaterally. (School boards setting salaries unilaterally may employ rules of thumb that are somewhat insensitive to market conditions.) If this hypothesis is true, we would expect base pay in bargaining districts to reflect prevailing alternative wages more closely than base pay in nonbargaining districts.

In order to study these possibilities, new "interaction" variables were created by multiplying all exogenous variables in our wage equations by the bargaining dummy variable. Each new interaction variable was paired with the bargaining dummy variable and entered in the wage equation for 1969-70. This resulted in the discovery that bargaining districts were significantly more sensitive to the alternative wage variable than were non-bargaining districts. This may be seen in Table 3.

One important characteristic of this formulation is that the impact of unionism on wages varied, depending on the particular labor market in which the bargaining district was located. Table 8 reveals the degree of impact of collective bargaining in the various labor markets of the state.
<table>
<thead>
<tr>
<th>Labor Mkts.</th>
<th>Impact (%)</th>
<th>Proportion of</th>
<th>Col. (1)</th>
<th>Incidence of Bargaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranked by</td>
<td>Bargaining</td>
<td>All Districts</td>
<td>x</td>
<td>in Market</td>
</tr>
<tr>
<td>Size of Alt.</td>
<td></td>
<td>with Union Contract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wage</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>High</td>
<td>+1.4</td>
<td>.456</td>
<td>.638</td>
<td>.78</td>
</tr>
<tr>
<td>Second</td>
<td>+.2</td>
<td>.228</td>
<td>.045</td>
<td>.70</td>
</tr>
<tr>
<td>Third</td>
<td>-.2</td>
<td>.038</td>
<td>-.007</td>
<td>.50</td>
</tr>
<tr>
<td>Fourth</td>
<td>-.6</td>
<td>.179</td>
<td>-.107</td>
<td>.75</td>
</tr>
<tr>
<td>Low</td>
<td>-.7</td>
<td>.097</td>
<td>-.165</td>
<td>.50</td>
</tr>
</tbody>
</table>

Weighted Average = +.40% percent

Col.(1): derived from \(-3.607 + .7273 \ln(\text{Alt.W}_{ij})\), times 100 to convert to percent, where \(i\) indicates a particular labor market.

Note: For purposes of this study the state was divided into seven labor markets, two of which were consolidated with the others in calculating this table due to similarity of wage rates.
When the mean value of the alternative wage is employed in computing the impact of collective bargaining, the net effect of bargaining is almost exactly zero. The reason the weighted average in Table 8 indicates a small positive impact of bargaining is because proportionately more bargaining districts are located in high-wage labor markets than low-wage markets. Thus, bargaining districts tend to be concentrated where bargaining tends to do teachers some good.

The weighted average of the impact of bargaining in Table 8 is weighted by the proportion of all bargaining districts in each labor market, not the proportion of all teachers covered by contracts in each labor market. Since school districts in high-wage labor markets tend to employ more teachers than districts in low-wage markets, a teacher-weighted average would reveal a somewhat larger impact of collective bargaining. Table 9 is based upon relatively crude computations from raw data, and so should be taken as indicative of general magnitudes, not as a precise tabulation.

Table 9
Impact of Bargaining on Base Pay, Using Teacher-Weighted Average

<table>
<thead>
<tr>
<th>Labor Mkt. Ranked by Wage</th>
<th>Proportion of all Teachers with Union Contracts (1)</th>
<th>Impact (%) of Bargaining (2)</th>
<th>Col. (1)</th>
<th>Col. (2)</th>
<th>Col. (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>.53</td>
<td>+1.4</td>
<td>.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second</td>
<td>.18</td>
<td>.2</td>
<td>.036</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Third</td>
<td>.07</td>
<td>-.2</td>
<td>-.014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth</td>
<td>.14</td>
<td>-.6</td>
<td>-.084</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fifth</td>
<td>.07</td>
<td>-1.7</td>
<td>-.119</td>
<td></td>
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</tr>
</tbody>
</table>

Teacher-weighted avg = .559 percent

Note: Col. (1) does not sum to one due to rounding.
The impact of bargaining is certainly not large. An increase of .4 percent (Table 8) relative to non-bargaining districts was only about $30 annually in 1969-70. The dollar amount of an impact of .55 percent (Table 9) is only about $40. The largest impact of bargaining in any of the labor markets is about 1.4 percent; this works out to be about $100 per year. These rather small estimates of the impact of collective bargaining are consistent with the results of other studies. (See Table 2.)

That collective bargaining might result in district salary scales becoming more attuned to prevailing labor market conditions is plausible. Why, however, should bargaining in some labor markets have lowered salaries below those in non-bargaining districts? Why should unionization ever lower relative wages? It is, of course, possible that school boards in low-wage markets were able to defeat the demands of the new unions. If the school boards had such power, why did they fail to use it in those districts—located in the same labor markets—that did not bargain? Surely power used against organized teachers can readily be turned against non-organized teachers. The only possible rationalization of this is that non-bargaining school boards did not employ their latent power, while something in the process of bargaining encouraged school boards in bargaining districts to employ their power. Possibly non-bargaining districts continued to set wages in an habitual manner, making use of rules of thumb, and failing to exercise latent power to depress wages. Bargaining, on the other hand, may have shaken the other districts out of habitual patterns and caused them to exert their latent power to depress wages (or at least resist wage increases).
Even this explanation leaves some issues to be resolved. Why should school boards in low-wage markets have the power to resist union demands while those in high-wage markets apparently lack such power? Or, were the teachers' organizations in the low-wage markets somehow weaker than unions in the high-wage markets? This seems likely. Low-wage labor markets are typically located in the rural areas of the state, and vice versa. The state teachers' association is likely to concentrate its professional resources in the urban districts rather than the rural ones. Furthermore, if pro-union sentiment in the public at large were to play a large role in supporting teachers' demands (and this may be questionable), such public support is more likely in urban than rural areas. Finally, if the incidence of collective bargaining in a labor market is any index of the strength of unionization, then the unions in the high-wage labor markets would have to be considered stronger than the unions in the low-wage markets. (See Col. 4, Table 8.)

If our central result is that negotiated wage scales appear more sensitive to labor market conditions than non-negotiated scales, we must ask whether such sensitivity is due to bargaining or whether districts that already were more sensitive to labor market conditions merely have a higher propensity to bargain than do other districts. Thornton (1971) found that bargaining in 1969-70 apparently raised relative wages in the districts he studied. However, he found that the same bargaining variables, introduced into wage equations for 1958, when no bargaining occurred, had positive and significant coefficients. That is, those districts that bargained in 1969 apparently had a tendency at least as early as 1958 to pay relatively high wages anyway. We must ask whether this is the case with our results.
In order to test for this possibility, the bargaining and interaction variables were introduced into the wage equations for the five years prior to 1969-70, the first year of official negotiations. In four of the five years the coefficients were insignificant, although they were significant in 1966-67. However, the magnitudes of none of these coefficients were ever as much as one-half the magnitudes of the coefficients in 1969-70, the bargaining year. This would suggest that some small tendency existed for bargaining to occur in districts that already were relatively sensitive to labor market conditions, but that negotiations surely accentuated this sensitivity.

It has been suggested that the rather meager impact of bargaining was due to the fact that negotiations were a new experience in 1969. This flies in the face of normal expectations. Presumably young unions attempt to prove their worth to members and potential members. This would suggest that when bargaining is a new experience relatively large gains would be attempted by the unions, and that if large gains failed to materialize it was not for lack of effort. If small gains occur during the "transition period" then perhaps small gains are all that can ever be expected.

A kind word for this "transition" theory is, however, possible. Although it is usually true that unions are aggressive when bargaining is a new experience, education is not a typical industry, and teacher unions are not typical unions. Although unions in other sectors are formed primarily for the purpose of bargaining, most local teachers' unions in New Jersey had existed for years as "professional associations." Bargaining was a function, in essence, superimposed upon local societies that may have been somewhat
hesitant or even reluctant to undertake a strange new role. Thus, during the transition, when local associations were learning to live with a new role, we might expect rather small gains.

Even if this view were correct, and even if we may expect somewhat larger gains from bargaining in the future, it is still difficult to predict that the gains will ever become large by usual standards. As emphasized previously, the power to raise wages resides in the power to deprive, by means of a strike, a profit-maximizing firm of its revenues. The strike in public employment plays no such role, and is essentially an instrument of politics. If a strike puts political pressure on a school board to settle, it will undoubtedly be successful. Political pressure, however, is a two-edged sword, and I fail to perceive any a priori basis for predicting that strikes will mobilize more support for teachers' demands than against them.

Further Results: the Maximum Pay of Teachers

It is of interest to see if collective bargaining has the same impact on other aspects of the single salary schedule as upon base pay. The following equation was estimated by ordinary least squares for the year 1969-70:

\[
\ln(\text{maximum pay}) = -1.06 + 0.016 \ln(\text{Num. pupils}) + 0.066 \ln(\text{Tax Base}) + 0.057 \ln(\text{Mod. Fam. Income}) + 0.977 \ln(\text{Alt. Wage}) - 3.60 (\text{Coll. Br. Dummy}) + 0.723 (\text{C.B.D.}) \times \ln(\text{Alt. Wage}).
\]

The number of observations was 298 and the \( R^2 \) was 0.605.
Maximum pay is defined as the largest annual salary that a teacher holding the bachelor-level degree can earn after accumulating experience up to some maximum level. All the coefficients in the equation are statistically significant. Without repeating the discussion of the preceding sections, we note that the "demand variables" such as tax base and community income have rather small coefficients, and that the main determinant of teachers' maximum pay appears to be the alternative wage.

The impact of collective bargaining is essentially the same for maximum pay as it was for base pay, although a three-stage least square estimate, comparable to the one in Table 3, would undoubtedly give somewhat different coefficients. In dollar terms, the impact of bargaining on maximum pay would be $50-$70, using a teacher-weighted estimate of the impact. The impact of bargaining on maximum pay levels in the high-wage labor market only would be $155-$160. This is still a relatively small impact upon wages.

Conclusion

The evidence presented in this section supports, on the whole, the predictions of the theory presented in section I. Considering the very large fluctuations in the wealth of communities (tax base, income), the amount of the variation of teachers' wages explained by wealth variables was exceedingly small. The practical implication of this finding is, first,
that wealthy school systems probably do not outbid poorer districts for better teachers. A second implication is that increased state aid, which may be interpreted as an effective increase in the wealth of a community, will not be translated automatically into a windfall for teachers; districts do not tend to spend much more on wages just because they are affluent. This implication is of importance for policy in the light of the Serrano decision. Some have suggested—for example Hoynihan (1972, p. 74)—that the "leveling up" process that will occur as states equalize the resources of school districts will simply enrich teachers. This would not seem to be an implication of this paper.  

A second conclusion is that the "unpleasant" working conditions associated with large school districts are not universally viewed by teachers as being highly distasteful. As a result, large urban districts do not have to pay very much more, percentage-wise, than their neighboring districts. Resources needed for other purposes are not spent, to any large degree, for the purpose of overcoming the reluctance of teachers to teach in large urban areas. The major determinant of the wages of teachers is the alternative wage. This was assumed by our theory, and seems to have been a good assumption. If it is legitimate to assume that the wages of teachers will be sensitive to alternative wages over time as well as across distance, then we may conclude that increases in the wages of teachers will continue at a rapid rate so long as wages elsewhere in the economy rise at a rapid rate. Little relief from this major cause of rising educational expenses would seem apparent.
Finally, we have found some small evidence that teachers' unions have an impact upon the wages of teachers. That impact appears to be very small. I would, however, hesitate to generalize this result. If I am correct in asserting that the impact of bargaining in public employment depends heavily on political considerations, then the political situation that existed in one state at one point in time provides little basis for predictions or generalizations.
1. Much recent research suggests that educational inputs such as teacher-student ratios may not be very effective in determining student performance. Our educational quality index does not necessarily take issue with these findings. The quality index concept requires only that school boards believe that teacher-student ratios, ability and experience are important.

2. If every school board had an entirely different definition of the attributes that constitute teaching ability, then (so long as all school systems were very small relative to the teacher market) ability would not be an economic good. School boards would bid up the price of ability only if there were some agreement about the desired attributes.

3. Sometimes teachers are able to earn extra income by supervising student activities. Very promising teacher candidates might be offered relatively well-paid jobs of this sort in addition to their normal duties as a way to circumvent the strict application of the single salary schedule. Such opportunities for circumvention are relatively rare. Furthermore, the wide use of such dodges by school boards would result in serious morale problems among faculty members not so favored.

4. Depending on the occupation, teachers may be relatively good or relatively poor substitutes for workers in other employment. Changes in wages in alternative occupations for which teachers are relatively good substitute workers should be reflected in teachers' wages relatively quickly. That is, the long-run adjustment of teachers' wages to the other wage occurs relatively quickly in such a case. The reverse is true for
occupations where teachers make poor substitute workers. Teachers are probably relatively good substitutes for workers in several occupations.

This view implies a particular perspective on so-called teacher "surpluses" and "shortages." That there are probably a number of occupations to which and from which teachers are rather mobile, means that a "shortage" or "surplus" of teachers--without there also being a "shortage" or "surplus" of workers in a whole cluster of other occupations--is unlikely. Analysis of the "shortage" literature of the mid-sixties reveals that there never was a general shortage: schools had unfilled positions in those special fields where all industries had openings--such as mathematics, physical science. The rest of the shortage existed only in the literature of the National Education Association which computed the number of teachers needed to fill positions that would be created if NEA's ideal teacher-student ratio were adopted nationally. The difference between the number of new positions needed to create NEA's ideal world and the number of teachers actually available was the "shortage."

The current "surplus" is also to be viewed with suspicion. It is probably no accident that the "surplus" was discovered just as the recent recession developed. It may be true that more certified teachers have been graduated than positions have opened; the surplus became apparent, however, only because unemployment in alternative occupations was also increasing. The "surplus" probably has not retarded the rate of increase of teachers' wages below that in alternative occupations.
5. That some teachers consider a certain school district to be "unpleasant" does not necessarily mean that such a district must pay higher wages than more "pleasant" districts in order to hire teachers of equal ability. If school districts are small relative to the teacher market, and if teachers' tastes are relatively diverse with respect to what constitutes an amenity or disamenity, then even districts that a majority of teachers consider to be unpleasant can fill their needs at the going rate by hiring from the minority of teachers that does not find the district distasteful. Teachers' tastes probably are diverse in this respect. Thus, if an urban school district is small relative to the market, it may not have to pay a very large "disamenity premium" even if a majority of teachers view the district with distaste.


7. The community income variable for any given year was derived from the 1960 census as follows. The median family income in each community in 1959, as given in the 1960 census, was multiplied by the ratio of median family income in the northeast in the year of interest to the median family income in the northeast in 1959.

8. Inclusion of the property tax base in the wage equations eliminates the need to include a tax rate as a variable. The tax rate, all else equal, is determined by the tax base per pupil.

9. It is possible, of course, that the aggregate short-run supply of teachers is less than infinitely elastic, and that an increase in aggregate demand due to a large increase in state aid to school districts could cause a short-run increase in teachers' wages. Our results suggest, however, that increased state aid will not directly induce districts to raise wages.


