1.0

1.1

1.25   1.4   1.6

2.5

2.2

2.0

1.8

ABSTRACT

                This study examines the impact of teachers'
organizations on the compensation of public school teachers. Part 1
focuses on the impact of collective bargaining on teachers' salaries;
part 2 deals with interstate variations in teachers' pensions and the
influence of teachers' organizations on these variations. In part 1,
the authors estimate the impact of collective bargaining through
regression analysis of factors other than unions that affect
teachers' salaries. Findings indicate that the impact of collective
bargaining on salaries is in the 0-5 percent range, and that
collective bargaining reduces the number of steps in the BA and MA
tracks. Part 2 derives an interstate index of pension benefits based
on data for 39 states. Regression analysis is used to explain
interstate variations in pension benefits and employee contributions.
Findings indicate that teachers' organizations have successfully
increased pensions for teachers with 25 years service, but have had
little impact on pensions for teachers with longer service.
(Author/JG)

Final Report

The Impact of Teachers' Unions

National Institute of Education Project No. 4-0136

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HEALTH, EDUCATION AND WELFARE

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ABSTRACT

This study is concerned with the impact of teachers'
organizations on the compensation of public school teachers.
In the first part of the study we examine the impact of
collective bargaining on teachers' salaries; in the second
part we deal with interstate variations in teachers' pen-
sions and with the role of teachers' organizations as an
influence on these variations.

Our analysis suggests that we should not limit the
study to a single salary measure but examine the impact
of collective bargaining on a number of measures and on
several aspects of teachers' salary structure. We estimate
the impact of collective bargaining in a series of regres-
sions in which we standardize for the influence of factors,
other than unions, that affect teachers' salaries. The
findings appear to confirm the expectations outlined in our
discussion of the factors shaping union policies: the
impact of collective bargaining is focused on the remuner-
ation received by experienced teachers with an MA degree.
The size of the impact on various salary measures is con-
sistent with the findings of previous studies, i.e. 0-5%
of the levels of particular salaries. Our findings indicate
also that collective bargaining reduces the number of
salary steps in the BA and MA educational tracks.

In part two we derive an interstate index of pension
benefits for teachers by applying state pension formulas
to average salaries of teachers in each of the 39 states
for which appropriate data are available. We also compute
an interstate index of employee contributions to state
pension funds. We then estimate regressions which are
expected to explain interstate variations in pension bene-
fits for retired teachers and in employee contribution.
The results indicate that teachers organizations, active
in lobbying in state legislatures, have been successful
in increasing considerably the pensions of those teachers
who retire after 25 years of service: the organizations
have had, however little impact on the pensions of teachers
who have accumulated long periods of service, i.e. those
whose pensions computed on the basis of state formulas, would
approach the levels of their final salaries.

INTRODUCTION

The purpose of this study is to examine the effect of
unionism--as exemplified by the activities of either the
local organizations of the National Education Association
or of the American Federation of Teachers--on the compen-
sation of public school teachers. The term compensation
has, of course, many component payments, including a variety
of possible fringe benefits. We will deal only with the
most important of these components--salaries and pensions.
Teachers' organizations influence salaries primarily
through collective bargaining with local school boards.
In the first part of this study we will analyze the effects
of such collective bargaining on the levels of teachers'
salaries and on the structural relationships of the various
measures of these salaries. In the second part of the
study we will deal with pensions--i.e. with both retire-
ment benefits of teachers and with the contribution that
teachers have to make toward such benefits. More specif-
ically, we will analyze the determinants of interstate
variations in pensions and contributions, and in the
course of that analysis we will try to measure the impact
exerted by the state organizations of teachers.

PART ONE

Collective Bargaining and Teachers' Salaries

I

The present study, its analytical approach and its
results, may be best viewed in the context of the findings
of other studies of the impact of unionism on salaries of
public school teachers. The common finding of these studies
is that, ceteris paribus, salaries received by teachers
who are represented in collective bargaining by a union
(or a teacher organization acting, in effect, as a union)
are not very much higher than the salaries of teachers
who are not working under a collective bargaining agreement.
Teachers' salaries have been measured in these studies in
a number of ways--by average salary of all teachers in a
school district, starting salaries (i.e. for those with a
BA degree and no experience), by minimum and maximum
salaries paid to those with different levels of formal
education; we will discuss these measures and their
relationship in greater detail later on. But it is useful
from the viewpoint of our immediate discussion of the
other studies to consider here briefly the question of
what measure of salaries should be used in a study of
the impact of unions.

A major reason why different studies used different
measure is that, in fact, there is no obvious "best" way

to measure salaries of public school teachers. Teacher
salary schedules vary from one school district to another
in a number of ways but they all prescribe salaries that
differ--within a given district--in accordance with formal
training and experience. The renumeration called for by
a given salary schedule is likely thus to differ among
individual teachers. Moreover some aspects of a given
schedule are likely to be of greatest importance to the
teachers, i.e. the supply side of the market while other
aspects will be of paramount interest to the school board,
i.e. the demand side.

From the point of view of the school board, the measure
of salaries that is most relevant for determining current
cost is presumably average salary. But, given an educa-
tion-experience composition of the teachers' work force,
average salary and current costs depend, of course, on
the salary schedules and the relation of the various sal-
aries, i.e. their structure. A school board is also likely
to be very much aware that changes in salary schedules and
structure will have implications not only for current but
also for future costs. Moreover, depending on a labor
market situation or a time period, a school board may be
particularly concerned about special components or features
of a salary structure. For example in times of expansion
and increased recruitment a board may consider starting

salaries to be of overriding importance. At other times
a board may feel great pressure to adjust the salaries
of teachers who have accumulated some experience in the
particular school district.

On the supply side teachers who are firmly committed
to teaching and perhaps to teaching in their current school
district may treat the salary schedule as a basis for
projecting their lifetime earnings. The more committed
teachers are also likely to have the greatest influence
on union salary policy. In contrast, new teachers who are
not firmly committed to teaching, or who expect to interrupt
their teacher careers may have a very short planning horizon
and little leverage on union policy. These teachers may
pay almost exclusive attention to starting and early year
salaries. They may view the salary schedule of a district
from the same perspective they would have viewed the internal
wage structure for any job, that is, as a schedule that
prescribes skill differentials relevant to their occupation,
but not necessarily the future course of their earnings.

As these preliminary considerations suggest, neither
market forces nor teachers' organizations negotiating a
contract are likely to affect in a uniform manner all the
components or features of teachers salary schedules and
structures. The implication thus is that a study of the
impact of collective bargaining should consider not

one salary measure but rather several such measures.   One
of our own purposes will be, indeed, to spell the kind of
impact that collective bargaining has on each of the major
components and features of salary schedules of public school
teachers.

As a background for our discussion we shall consider
in this section a few of the more important and represen-
tative studies of the impact of teachers' unions on salaries.
Most of these studies are essentially empirical in nature,
attempting to measure the extent of such an impact. A
study by Wellington and Winter is an exception.[1] That
study is concerned with an analysis of the relative
strength of unions in the public sector--including, of
course, teachers' organizations--as compared with that in
the private sector, and with the various issues of public
policy stemming from the special position of public sector
unions.

In Wellington and Winter's view there are several
reasons why public employee unions--such as teachers'
organizations bargaining with a local authority--can be
expected to have more market power than a typical union
in the private sector: inelastic demand for government
services; absence of profit motive on the part of the
"management"; the fact that the public does not see clearly

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[1]H. H. Wellington and R. K. Winter Jr. The Unions
and the Cities, Washington, D.C. 1971. As the title suggests
the volume deals primarily with organizations of municipal
or local government employees.

a relation between local budget increases resulting from
union gains and increases in taxes; political pressures
on the mayor or other officials to stop a strike that causes
inconvenience; and others. The overall implication of the
Winter and Wellington study is that, in the absence of
special policy measures, public sector unions could be
expected to make salary or wage gains well above those
made typically by labor organizations presumably restrained
by the market forces of the private sector of the economy.

While much of the evidence cited by Wellington and
Winter is essentially of an ad hoc nature, they do provide
a thorough and insightful analysis of the economic and
political aspects of collective bargaining by public
employees--an analysis very much relevant to a study of
the impact of teachers' unions. But the hypotheses which
they set forth with respect to the determinants of relative
union strength have yet to be tested on a systematic basis.[2]

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[2]Some of the crucial points of Wellington and Winter's
analysis--e.g. those pertaining to the relative absence
of market restraints in the public sector or to the political
pressures to stop public sector studies--have been challenged
by other students, particularly Burton and Krider. (See
J. F. Burton Jr. and C. Krider, "The Role and Consequences
of Strikes by Public Employees," Yale Law Journal, January
(1970).)

The other major studies to be considered here deal
specifically with teachers' salaries and the way they have
been affected by collective bargaining. The data and
variables employed in each of these studies are summarized in
Table 1. It can be seen from the table that these studies
differ from one another both in terms of the population
which underlies the data sample and in terms of the
specification of the teachers' salary equation. From
the published results alone it is not possible to tell
whether differences in the findings of the various studies,
where they exist, are due to differences in the underlieing
populations or to differences in methodology.

The article by Kasper is the earliest of the six
papers.[3] His findings seem to indicate that teachers' unions
have only a weak effect on teachers' salaries. Specifically,
his best estimates suggest a union impact on teachers'
salaries of about four percent. A major weakness of this
study is a poor specification of the wage equation. As
Schmenner has pointed out, one independent variable

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[3]H. Kasper, "The Impact of Collective Bargaining on
Public School Teachers," Industrial and Labor Relations
Review, October 1970, pp. 57-72.

in this equation is the amount of spending per student.[4]

This variable is, of course, very strongly influenced by

the dependent variable in the wage equation, teachers'

salaries. Thus is should, at least, be treated as an

endogenous variable. More importantly, it appears that

total spending per student should not be included at all

as an independent variable in a reduced form wage equation.[5]

Another relatively early study was that of R. J.

Thornton.[6] Although Thornton specifies supply and demand

separately, he assumes that the demand curve for teachers

is perfectly inelastic. This simplifies his analysis

considerably by allowing him to avoid the problems that

stem from the simultaneous interaction of the supply and

demand. If this assumption is incorrect, his results will

be subject to specification error.

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[4] P. W. Schmenner, "The Determinants of Municipal Employee Wages," Review of Economics and Statistics, February 1973, pp. 83-90.

[5] See for instance the derivation of the wage equation in M. O. Clement and A. L. Gustman, Factor Cost Differences Educational Equality and Funding Decisions in Public Education. Project No. 2-0681, National Institute of Education pp. 20-21.

[6] R. J. Thornton, "The Effects of Collective Negotiations on Relative Teachers' Salaries," Review of Economics and Business, Winter 1971, pp. 37-46.

Thornton's finding as to the size of the union impact on the base pay of teachers is not far from Kasper's. He estimates the impact to be about two percent. His results also indicate a large (twenty-three percent) impact of unions on the maximum salary paid to those teachers who have earned a Masters Degree. However, it should be noted that this last finding is based on a regression where the R^2 is .07, while the comparable R^2s for other of Thornton's regressions are in the neighborhood of .50. The implication, which Thornton recognizes, is that this estimate of the effect of unions on the maximum salary for those with a Masters Degree may not be totally reliable.

In a comment on Kasper's article, Baird and Landon added a new dimension to the analysis.[7] In their empirical estimates they include as an independent variable the number of school districts in the same county as the observed school district. This variable is meant to standardize for the effects of differences in the degree of monopsony

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[7] R. N. Baird and J. H. Landon, "The Effect of Collective Bargaining on Public School Teachers' Salaries--Comment," Industrial and Labor Relations Review, April 1972 pp. 410-17. See also "Reply" by H. Kasper in the same issue.

Table 1: DATA AND VARIABLES EMPLOYED
IN VARIOUS STUDIES OF
TEACHERS UNIONS

AUTHOR	TYPE OF DATA	WAGE VARIABLE	INCOME VARIABLE	ALTERNATIVE OCCUPATION OR OTHER EMPLOYMENT CONSIDERED	PROPERTY VARIABLE
Kasper	State data 1966-67	Average teacher salary (statewide)	State per capita income		
Thornton	83 districts in large cities (pop. 100,000 and over)	Minimum and Maximum salaries for BA and MA degree holling teachers		Average level of wages and salaries in the city for all employees	
Landon and Baird	44 districts enrollment size 25.000 to 50,000	Entry salary (min. for BA with no experience)	Per capita income		Effective property tax rate
Hall and Carroll	118 elem. school districts in suburban Cook County	Average teacher salary	Med. family income	% White collar	
Schmenner	11 large cities years 1962-1970	Entry salary (min. for BA with no experience)		Office clerical employees	Property assessment per capita % Δ in prop. tax rate
Frey	298 districts in New Jersey, 1964 to 1970	Entry salary (base pay for BA teachers, with no experience)	Med. family income	Industrial nurses	

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Table 1 (Continued)

AUTHOR	REVENUE&/OR EXPENDITURE VARIABLES	UNIONIZATION VARIABLES	TEACHER CHARACTERISTICS VARIABLES	OTHER VARIABLES
Kasper	% revenue from Fed % revenue from State % revenue from Local Current Exp./pupil	% teachers represented % districts with represen-tation % of formal agreements	% teachers with substandard certificates % elemen. teach-ers	% urban dummy for Western states
Thornton		Dummy vari-able, measure whether dis-trict had negotiated agreement with a recog-nized teacher's organization	Percent of Teach-ers with less than standard teaching certificates	District Size Pupil/Teacher Ratio
London and Baird	% revenue from local sources	Dummy: Collective Negotiations? % NEA % AFT		# of districts in the county of district in question
Hall and Carroll	State aid/pupil as a % of expend per pupil (operating expenditures)	Dummy: exis-tence of a collective bargaining agreement	% Male teachers mean yrs. exper-ience of teachers	Average daily Atten-dance In another equation also % urban, population, and pupil/teacher ratio
Schmenner		Collective bar-gaining dummy # work stoppages per area employee		City population to metro. area population school district dummy (independent or dependent)
Frey	State aid (total & equalized portion) considered & rejected	Collective Bargaining dummy		Average Daily Attendance (proxy for pleasantness or unpleasantness of work)

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power on the part of school boards. The presumption here is, as noted by Kasper, that the scope of the market coincides with the geographical boundaries of the county. In the Baird and Landon study, union impact is estimated to be about five percent and is thus in close agreement with Kasper's findings.[8]

In their study of elementary school districts in Cook County, Illinois Hall and Carroll introduced another innovation.[9] The methodologic innovation in that study involves the treatment of class size as an independent variable which is determined simultaneously with teachers' salaries. Both teachers' salaries and class size are said to be influenced by unions.

The findings of these authors are somewhat curious. Their estimates indicate that unions have a positive effect on both salaries and class size. The implication is that

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[8] However, Thornton's calculations--applied to his own sample of districts--showed no significant relation between the "degree of monopsony," as measured by Baird and Landon, and teachers' salaries. See R. J. Thornton, "Monopsony and Teachers' Salaries: Some Contrary Evidence," *Industrial and Labor Relations Review*, July 1975, pp. 574-75, and "Reply" by Baird and Landon in the same issue.

[9] W. C. Hall and N. E. Carroll, "The Effects of Teachers' Organizations on Salaries and Class Size," *Industrial and Labor Relations Review*, January 1973, pp. 834-41.

unions trade for higher salaries by accepting larger
classes. (This implication is, of course, inconsistent with
Thornton's assumption of an inelastic demand curve for
teachers). What is most puzzling about their findings
is that the increase in class size due to unions lowers
costs by more than the union impact on salaries raises costs.
That is, the net effect of unions is to lower the cost of
education. While one could try to rationalize these results,
they do seem to suggest that the union variable in either
the wage or class size equation may be picking up some
unmeasured characteristics that are operating in communities
where unions have negotiated a collective bargaining agree-
ment in such a way as to affect systematically the negotiated
salaries or class size.

The empirical studies reviewed so far base their estimates
on cross-section data for a particular period. In his article,
Schmenner utilizes pooled cross-section time series data
for eleven cities from 1962 to 1970.[10] For this sample
of very large cities, Schmenner found a union impact of
between twelve and fourteen percent.

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[10] R. W. Schmenner, "The Determination of Municipal
Employee Wages, op. cit.

A major weakness of Schmenner's study appears to be a failure to control adequately for the effects of growing student enrollment on the demand for teachers throughout the period covered by his analysis. The only variable included which might reflect some of the growth in demand is a measure of the change in the property tax rate in each city. Since the enrollment growth throughout the 1960's corresponded with the growth in unionization, any effects of growing demand for teachers on teachers' salaries that are not fully reflected in the local tax rate may lead to an upward bias in the estimated effect of unionization on teachers' salaries. Such a bias might, at least in part, account for the fact that Schmenner's findings indicate a much stronger effect of unions on teachers' salaries than do the other studies reviewed here.

The last study summarized in Table 1 is by Donald Frey.[11] Frey finds only a weak (less than two percent) impact of collective bargaining on wages, even after allowing for

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[11]The summary is based on D. E. Frey "Wage Determination in Public Schools and the Effects of Unionization" in D. S. Hamermesh ed. Labor in the Public and Nonprofit Sectors, Princeton, 1975 and on D. E. Frey, "Wage and Employment Effects of Collective Bargaining in Public Schools in New Jersey," Unpublished Ph.D. Dissertation, 1972, Princeton University.

interaction effects between the union variable and all other variables included in the wage equation. While this finding is consistent with those of most of the studies discussed above, it remains subject to some questions. The reason is that Frey's estimates of an employment equation, which alo..g with the teacher salary equation is a basic element of his model, are perverse and apparently inconsistent with his theoretical analysis. Specifically, his results indicate that in those districts where the opportunity cost of teachers is high, the school board will have a tendency to hire more teachers.

In addition to the authors mentio.. ed in Table 1, there have been also other students that have pursued the subject of the impact of unions on teachers' salaries. But while the data and the methods used by these students differ, the results appear to be pretty much the same as those of the major studies summarized above.[12] We should take, however, special notice of a study by G. Moore that focused

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[12]See, for example, D. B. Lipsky and J. E. Drothing "The Influence of Collective Bargaining on Teachers' Salaries in New York State," Industrial and Labor Relations Review, October 1973; E. F. Kirk, A Theoretical and Empirical Study of the Impact of Collective Negotiations on Public School Teachers' Salaries in the Commonwealth of Massachusetts, unpublished Ph.D. Dissertation, Boston College, 1974.

on an aspect of teachers' salaries not examined in previous
research.[13] Moore examined the impact of collective
bargaining on the salary differential between elementary
and secondary school teachers in 201 school districts of
Nebraska. His results indicate that collective bargaining
reduced such a differential by an amount equal to about
6% of an average teacher salary in the state. In view of
the wide prevalence of single salary schedules, i.e.
schedules instituting internal salary differences only on
the basis of educational attainment or experience--the
of a union impact described by Moore is not likely to be
found in many school districts. The more important
contribution of the study is probably the fact that it
calls attention to the possible influences of collective
bargaining on the structure, as distinct from levels, of
teachers' salaries.

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[13]G. A. Moore, "The Effect of Collective Bargaining on
Internal Salary Structures in the Public Schools," Industrial
and Labor Relations Review, April 1976.

Teacher's organizations have been formally recognized

for purposes of bargaining only since 1960.[14] But on a

less formal basis these organizations have influenced

teachers' salaries for decades. In particular, the National

Education Association played an important role in fostering

what, by the end of World War II, was the virtual nationwide

adoption of the single salary schedule. As a result, with

rare exception, within school districts teachers' salaries

differ for only two reasons--differences in formal educa-

tion and differences in experience.[15]

While the salary schedules adopted by different school

districts have the same general structure, the specific

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[14]In 1960, the United Federation of Teachers (UFT) was
recognized as the bargaining agent for New York City Public
school teachers.

[15]The economic implications of the single salary schedule
and the history of its adoption are discussed in Joseph A.
Kershaw and Ronald N. McKean, Teacher Shortages and Salary
Schedules, McGrawHill, New York 1962. It should be noted
that out of a group of sampled school districts with over
6000 students five percent reported provisions for pay dif-
ferentials to be based on merits. But these differentials
are minor compared to differentials for experience and
formal training. And no school district with over 100,000
students reported that it provides extra pay for meritorious
service. (National Education Association, Salary Schedules
and Fringe Benefits for Teachers, 1972-73: Washington,
D.C. 1973, p. 26).

details may vary considerably. As a first step in our
study of the impact of unions on salaries and their structure,
we examine the basic features of the single salary schedule.
We then describe the ways in which specific features of
these schedules differ among school districts.

The salary schedules typically consist of a number of
tracks, with each track representing a level of formal
training. The tracks are, in turn, divided into steps.
An individual normally progresses one step for each addi-
tional year of experience up to some maximum number, after
which number pay no longer increases with experience.[16]
All tracks within the schedule of a district need not have
an identical number of steps. Usually, if there are differ-
ences in the number of steps, there will be more steps in
the tracks requiring the higher levels of formal training.

The schedules used by different school districts may
differ in a number of respects. There may be differences
in starting salary, the number of tracks, the additional
pay associated with a given track, the number of steps
within a given track, and the average size of each step.

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[16]We should take note of the fact that in about one
quarter of the school districts with over 6,000 students
sampled by the NEA, provision for long service increments
beyond regularly scheduled maximums have been adopted.
National Education Association, Salary Schedules and Fringe
Benefits in Teachers, 1972-73, op. cit., p. 25.

As a result of all of these, the maximum pay by level
of formal education will also vary among districts.

Two sets of data pertaining to the various dimensions
of teachers' salary schedules are examined below. In one
set average characteristics of the salary schedules for a
sample of school districts with enrollments of over 6,000
students are reported. The other set consists of data
pertaining to the various features of the salary schedules
adopted by 93 central city school districts which are
part of the largest SMSA's in the country. The data for
the 93 large districts will form the basis for our empirical
study of the impact of teachers' unions on teachers'
salaries.[17]

In Tables 2 and 3 data for samples of school districts
with over 6,000 students enrolled are reproduced from an
NEA study. These data span the ten year period from 1962-63
to 1972-73. Before attempting to interpret the data, a
word of warning is called for. The composition of the
sample of school districts varies from one year to the
next. Therefore, more than normal care should be exercised
when examining the data for any apparent trends. This is
particularly so when examining data for those with training

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[17]The list of these districts is in Appendix A.

beyond the masters degree. Since relatively few teachers
have attained such high levels of formal education many
districts do not have a formal salary track beyond the one
for those with a master's degree. In particular, in 1972-73,
the salary schedules of only half of the sampled school
districts with over 6,000 students included in a separate
track for those with an earned doctorate.[18]

From the data reported in Tables 2 and 3 it can be
seen that over the past decade, the average values of the
minimum and maximum salaries scheduled for those in each
track have been characterized by strong upward trends.
The index numbers reported in Table 3 indicate, however,
that there are some differences in the rates of growth for
each of the scheduled salaries. For one thing, the salaries
paid to those with a BA degree or with an MA degree plus
thirty credits (6 years of schooling) have grown more slowly
than have salaries paid to those with either an MA or a
Ph.D. degree. For another, it can be seen that the differences

[18]Our analysis of the impact of collective bargaining
on teachers' salaries will be, in fact, limited to the
effects salaries and salary structure of those with a BA
or an MA degree. The salaries of teachers with education
beyond the master's degree are excluded from our study.
One reason is that, as noted above, many school districts
do not have formal salary schedules for such teachers. More-
over the number of teachers with training exceeding an
MA is relatively small.

Table 2

COMPARISON OF MEAN SCHEDULED SALARIES, 1962-63 THROUGH 1972-73

Preparation level and enrollment stratum	1962-63	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
1	2	3	4	5	6	7	8	9	10	11
(enrollment 6,000 or more)										
Number of reporting systems*	557	1,063	1,071	1,104	1,080	1,199	1,142	1,176	1,179	1,240
Mean scheduled salary for:										
Bachelor's--Minimum degree	$4,331	$4,707	$4,925	$5,144	$ 5,522	$ 5,941	$ 6,383	$ 6,850	$ 7,061	$ 7,357
degree --Maximum	6,426	6,937	7,262	7,590	8,133	8,690	9,278	10,012	10,299	10,768
Master's --Minimum	4,680	5,085	5,350	5,600	6,043	6,546	7,058	7,599	7,837	8,176
degree --Maximum	7,054	7,723	8,167	8,578	9,248	9,981	10,717	11,630	11,973	12,563
Six years --Minimum	5,310	5,705	5,900	6,151	6,585	7,154	7,673	8,266	8,501	8,878
(M.A.+30) --Maximum	8,236	8,975	9,385	9,808	10,399	11,273	12,002	12,975	13,308	13,928
Doctor's --Minimum	5,417	5,723	6,057	6,350	6,882	7,471	8,070	8,712	8,943	9,402
degree --Maximum	8,199	8,917	9,452	9,936	10,751	11,602	12,452	13,461	13,805	14,562

* Not all systems report all preparation levels.

† For earned doctor's degree or seven years of preparation.

Source: National Education Association, Salary Schedules and Fringe Benefits for Teachers, 1972-73, Research Report 1973-R2 1973.

Table 3

COMPARISON OF MEAN SCHEDULED SALARIES, 1962-63 THROUGH 1972-73
Index 1962 = 100.0

Preparation level and enrollment stratum	School Year									
	1962-63	1964-65	1965-66	196_-67	1967-68	1968-69	1969-60	1960-71	1971-72	1972-73
(enrollment 6,000 or more)										
Number of reporting systems[*]	557	1,063	1,071	1,104	1,080	1,199	1,142	1,176	1,179	1,240
Mean scheduled salary for:										
Bachelor's--Minimum degree	100.0	108.7	113.7	118.8	127.5	137.2	147.4	158.2	163.0	169.9
degree --Maximum	100.0	108.0	113.0	118.1	126.6	135.2	144.4	155.8	160.3	167.6
Master's --Minimum	100.0	108.7	114.3	119.7	129.1	139.9	150.8	162.4	167.5	174.7
degree --Maximum	100.0	109.5	115.8	121.6	131.1	141.5	151.9	164.9	169.7	178.1
Six years --Minimum	100.0	107.4	111.1	115.8	124.0	134.7	144.5	155.7	160.1	167.2
(M.A.+30) --Maximum	100.0	109.0	114.0	119.1	126.3	136.9	145.7	157.5	161.6	169.1
Doctor's --Minimum	100.0	105.6	111.8	117.2	127.0	137.9	149.0	160.8	165.1	173.6
degree[†] --Maximum	100.0	108.8	115.3	121.2	131.1	141.5	151.9	164.2	168.4	177.6

[*] Not all systems report all preparation levels.

[†] For earned doctor's degree or seven years of preparation.

Source: Table 2

in rates of growth between the minimum and maximum salaries
prescribed for those within each track are even smaller than
are the corresponding differences between tracks. The
relative differences between minimum and maximum salaries
narrowed slightly for those in the BA track. For the other
tracks the relative differences have been characterized
by widening. In the cases of the MA and Ph.D. tracks, the
increase in maximum salaries was 3 to 4 percent greater
than was the increase in minimum salaries.

The picture of how salaries vary with experience and
formal training (education) emerges upon examining the data
in Table 4. Each figure in the table represents the average
difference in salary scheduled for a person with the formal
training and experience indicated in the first column of
the table as compared to what salary would be for a person
with the formal training and experience indicated in the
first row. The average salary data for 1972-73 listed in
column 11 of Table 2 were used to compute the dollar
differences reported in Table 4.

The absolute differences in scheduled salaries for
those with different levels of formal education and experience

have been expressed in percentage terms in Table 5.[19]
The figures in the table indicate a number of things about
the structure of salary schedules. For example, it can be
seen from these data that relative difference between the
maximum and minimum scheduled salaries for those with a
given level of formal training--what may be called the
salary spread within a salary track--is lower for those
with a BA degree than it is for those with higher levels of
formal training. Specifically, the relative difference
between maximum and starting pay for those with a BA degree
is 46 percent. The salary spreads for those with an MA
degree plus 30 credits, and a Ph.D. are 54, 57 and 55
percent respectively.

The data in Table 5 also indicate that the differences
in starting salary or in maximum salary that result from
differences in formal education are smaller than are the
differences between maximum and starting salaries for those
with a given level of education. The starting salary for
a person with an MA degree exceeds starting salary for a

_____

[19]Specifically, the indicated differences in a particular
cell are equal to the ratio of the average salary indicated
in the first column divided by the average salary indicated
in the first row minus one, with the total multiplied by
100. The figures contained in Table 4 are, of course, not
equal to the average of the corresponding ratios computed
separately for the salary schedules by all school districts
in the sample.

Table 4

Differences in Average Scheduled Salary by
Level of Formal Training and Experience, 1972-73[*]

	BA-	BA+	MA-	MA+	(MA+30)-	(MA+30)+	Ph.D.-	Ph.D.+
BA-	0	-	-	-	-	-	-	-
BA+	3411	0	-	-	-	-	-	-
MA-	819	-2593	0	-	-	-	-	-
MA+	5206	1795	4387	0	-	-	-	-
(MA+30)-	1521	-1890	702	-3685	0	-	-	-
(MA+30)+	6571	3160	5752	1365	5050	0	-	-
Ph.D.-	2045	-1366	1226	-3161	524	-4526	0	-
Ph.D.+	7205	3794	6386	1999	5684	634	5160	0

[*]The figures in each cell are the dollar differences in scheduled salary between those with the formal training and experience indicated by the first column and those with the formal training and experience indicated in the first row.

        BA-   Salary for a teacher with a BA degree and no experience.
        BA+   Maximum salary for a teacher with a BA degree.
        MA-   Salary for a teacher with an MA degree and no experience.
        MA+   Maximum salary for a teacher with an MA degree.
    (MA+30)- Salary for a teacher with 30 credits beyond the master's
                  degree and no experience.
    (MA+30)+ Maximum salary for a teacher with 30 credits beyond the
                  master's degree.
    (Ph.D.)- Salary for a teacher with a Ph.D. degree and no experience.
    (Ph.D.)+ Maximum salary for a teacher with a Ph.D. degree.

Source: Data in Table 2, column 11.

Table 5

Percent Differences in Average Scheduled Salary [*]
by Level of Formal Training and Experience, 1972-73

	BA-	BA+	MA-	MA+	(MA+30)-	(MA+30)+	Ph.D.-	Ph.D.+
BA-	0	-	-	-	-	-	-	-
BA+	46	0	-	-	-	-	-	-
MA-	11	-24	0	-	-	-	-	-
MA+	71	17	54	0	-	-	-	-
(MA+30)-	21	-18	9	-29	0	-	-	-
(MA+30)+	89	29	70	11	57	0	-	-
Ph.D.-	28	-13	15	-25	6	-33	0	-
Ph.D.+	98	35	78	16	64	5	55	0

[*] The figures in each cell are equal to the ratio of the scheduled salary for a person with the qualifications indicated in the first column to the salary scheduled for a person with the qualifications indicated in the first row, minus one, with the result multiplied by 100.

Source: Data in Table 2, column 11.

person with a BA degree by 11 percent. Having 30 credits
beyond the MA raises starting salary on the average by nine
percent above what a person with an MA could be paid. And
earning a Ph.D. would raise starting salary by only an
additional six percent. The comparable differences in
maximum salary associated with the higher levels of formal
training are 17, 11 and 5 percent respectively.

The fact that two districts have scheduled the same
minimum and maximum salaries for a person with a given
level of education does not mean that the schedules of the
two districts will be viewed as equivalent to one another
by a potential teacher applicant. To judge between the
schedules, it would be important to know how quickly the
maximum salary can be attained, i.e. how many steps are in
the relevant track of the salary schedule. In 1972-73
the NEA reported that for school districts with over 6,000
students, the average number of steps in the BA, MA, MA+30
and Ph.D. tracks were 13, 13, 14 and 11 steps respectively.

The average scheduled salaries in the NEA sample of
districts with over 6,000 students provide a point of
reference to compare with the schedules in the 93 large
city school districts that form the basis of our later
empirical analysis.[20] Scheduled salaries for the two

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[20]The average enrollment in the 93 school districts
used in our sample is 98000 students.

samples are compared in Table 5. A number of points can
be made on the basis of the comparison. First, scheduled
salaries are higher for the city sample than they are for
the NEA sample. Second, the relative difference in maximum
salaries is greater than is the comparable difference in
starting salaries. This means that the spread between starting
and maximum salaries within any track is greater for the
districts in the city sample than it is for those in the
NEA sample. Third, the difference between the samples in
maximum salary paid to those with a BA degree is greater
than is the comparable difference for those with an MA
degree. What this means for a person with maximum experience
is that the proportionate increase in salary paid for having
earned a masters degree is less in the 93 city school
districts than it is in the NEA sample districts.

Table 6

Comparison of Average Scheduled Salaries
in 93 Central City School Districts and NEA
Sample of Districts with Enrollment at Least 6,000: 1972-73

	(1) Average for 93 Districts	(2) Average for NEA Sample	(3) Dollar Difference	(4) Percent Difference
BA starting salary	$ 7,520	$ 7,357	$163	2.2%
BA maximum salary	11,475	10,768	707	6.6
MA starting salary	8,280	8,176	104	1.3
MA maximum salary	13,022	12,563	459	3.7

Source: National Education Association, Salary Schedules and Fringe Benefits for Teachers, 1972-73, op. cit.

The number of steps in the salary schedules may also be compared between the two samples. In the 93 large city school districts the average number of steps in the BA track is 11.4. In the MA track it is 12.6. For the NEA sample districts, the rounded average number of steps is 13 for both the BA and MA tracks.

Scheduled starting salaries, maximum salaries and the
number of steps in each salary track vary considerably among
school districts. It can be seen from the data in Table 7
that the scheduled maximum salaries vary relatively more
than do the starting salaries. The greatest variation is
in the number of steps scheduled within each of the tracks.

Table 7

DISPERSION OF SCHEDULED SALARIES AND
NUMBER OF STEPS IN THE BA AND MA TRACKS OF
93 LARGE CITY SCHOOL DISTRICTS, 1972-73

	Mean	Standard Deviation	Coefficient Variation	High	Low	Range
BA starting salary	$ 7,520	$ 681	.091	9,571	6,000	3,471
BA maximum salary	11,475	1,630	.142	15,254	8,222	7,032
MA starting salary	8,280	767	.093	11,250	6,900	4,350
MA maximum salary	13,021	1,658	.127	16,600	9,162	7,438
No. steps-- BA track	11.4	3.1	.272	24	4	20
No. steps-- MA track	12.6	2.7	.214	25	7	18

Source: NEA, Salary Schedules and Fringe Benefit for Teachers,
1972-73, op. cit.

IV

The finding that there are differences in the relative
variation of starting and maximum salaries reflects the
fact that the structure of salary schedules varies from
one district to the next. An implication is that the
salary scheduled for a person with a given level of formal
training and experience may not prove to be a useful
index of the relative value of an entire salary schedule.
For example, since two districts that offered the same
starting salary might not schedule the same compensation
for a teacher with a BA degree and ten years experience,
it would be a mistake to label the schedules as equivalent
based only on evidence of starting salaries.

An indication of how closely various features of
salary schedules are correlated for the sample of 93 city
school districts is provided by the data in the first
seven columns and rows of Table 8. It can be seen that
the scheduled minimum and maximum salaries vary relatively
closely together. But the variation is not close enough
to use a particular scheduled salary, e.g. starting salary,
as an index for the other salaries in a schedule. For
example, the starting salary for those with a BA degree
accounts respectively for 69, 85 and 64 percent of the

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variations among school districts in the scheduled salaries
for those with a BA degree and maximum experience, an MA
degree and no experience, and an MA degree and maximum
experience.

It is also apparent from the data in Table 8 that
there is generally a weak negative correlation between the
level of salaries scheduled and the number of steps in
the BA and MA tracks. That is, those with the highest
scheduled salaries have a slight tendency to reach the
maximum salary after teaching for relatively short periods
of time.

An obvious next step in measuring the value of salary
schedules is suggested by human capital theory. For those
beginning teachers who wish to stay in a school district,
the value of the entire salary schedule may be represented
by the present value of earnings promised if the individual
were to enter teaching in that district and to remain
there for his or her working life. For a new teacher who
is uncertain about whether to remain in teaching or not,
the choice of which district to begin teaching in may
be based on an expected value calculation, where starting
salary and present value of salary for a district are
weighted in accordance with the probability of the teacher
remaining in the district.

Table 8

Correlation Among Various Features
of Salary Schedules and the Present
Values of the Schedules, 93 Large City School
Districts 1972-73

	BA-	BA+	MA-	MA+	#BA	#MA	$PVBA_0$	$PVMA_0$	$PVBA_5$	$PVMA_5$	$PVBA_{10}$	$PVMA_{10}$
	1	-	-	-	-	-	-	-	-	-	-	-
	.83	1	-	-	-	-	-	-	-	-	-	-
	.92	.75	1	-	-	-	-	-	-	-	-	-
	.80	.86	.81	1	-	-	-	-	-	-	-	-
	-.02	.27	-.13	-.02	1	-	-	-	-	-	-	-
	-.18	-.01	-.25	-.11	.84	1	-	-	-	-	-	-
$_0$	.86	.99	.79	.87	.18	-.09	1	-	-	-	-	-
$_0$	.82	.85	.85	.99	-.11	-.21	.87	1	-	-	-	-
$_5$	.89	.98	.82	.88	.10	-.17	1	.89	1	-	-	-
$_5$	.85	.85	.88	.98	-.17	-.29	.87	1	.89	1	-	-
$_{10}$	.92	.96	.85	.88	.02	-.23	.98	.90	1	.91	1	-
$_{10}$	.86	.82	.91	.95	-.22	-.34	.86	.98	.89	1	.91	1

BA- --Salary for a teacher with a BA degree and no experience.
BA+ --Maximum salary for a teacher with a BA degree.
MA- --Salary for a teacher with an MA degree and no experience.
MA+ --Maximum salary for a teacher with an MA degree.
#BA --Number of steps in the BA track.
#MA --Number of steps in the MA track.

(Table Cont.)

$PVBA_0$ --Constant level of yearly income that will generate the present value of the BA track at zero interest.

$PVMA_0$ --Constant level of yearly income that will generate the present value of the MA track at zero interest.

$PVBA_5$ --Constant level of yearly income that will generate the present value of the BA track at 5% interest.

$PVMA_5$ --Constant level of yearly income that will generate the present value of the MA track at 5% interest.

$PVBA_{10}$ --Constant level of yearly income that will generate the present value of the BA track at 10% interest.

$PVMA_{10}$ --Constant level of yearly income that will generate the present value of the MA track at 10% interest.

Source: Computed from data in National Education Association, <u>Salary Schedules and Fringe Benefits for Teachers, 1972-73</u>, <u>op</u>. <u>cit</u>.

It is convenient to measure the value of the salaries

promised by a particular educational track in a salary

schedule by an index that is equal to the constant level

of yearly income that would generate the same present value

as is generated by the salaries scheduled for those within

a given track.[21] Since this index will have a value that

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[21]We compute the constant level of yearly income from
data on starting salary, maximum salary and number of salary
steps. It is assumed for purposes of the calculation that
all salary steps within a track are of equal dollar size.

To be more specific,·suppose there are m increments
in salary for those in a given track, starting salary
is BA-, and the working life extends from 0 to year n.
The salary scheduled in year i is given by

(a) W_i = BA- + j(ΔW) where:
$$j = i \text{ for } i = 0,1,\ldots,m$$
$$j = m \text{ for } n \geq i > m$$
$$W_i = 0 \text{ for } i > n.$$

The equation for the present value of lifetime earnings (LE)
promised to an individual who remains in the salary track
until retirement is

(b) $$LE = \sum_{i=0}^{n} \left(\frac{W_i}{(1+r)^i}\right).$$

where r is the discount rate.
There is some constant level of yearly income PV which
has a vlue such that

(c) $$LE = \sum_{i=0}^{n} \left(\frac{PV}{(1+r)^i}\right) = PV\left(\sum_{i=0}^{n} \left(\frac{1}{(1+r)^i}\right)\right).$$

Setting (b) equal to (c) solving for PV we have

(d) $$PV = \left[\sum_{0}^{n} \frac{W_i}{(1+r)^i}\right] \cdot \left[\frac{1}{\sum_{0}^{n}\left(\frac{1}{1+r}\right)^i}\right]$$

is comparable to the levels of salaries scheduled in various
tracks, the use of the index will make it relatively easy
to compare the regression equations estimated below which
are used to test hypotheses about the causes of inter-
district variation in particular scheduled salaries and in
present values of lifetime earnings promised by salary
schedules.

The constant value of yearly income is computed from
data for the 93 city school districts using assumed rates
of interest 0, 5 and 10 percent. It is assumed that
working lives extend from age 25 to 65.[22]

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[22]We note explicitly that the calculated present values
and equivalent constant levels of yearly income provide
an index but not a prediction of lifetime earnings for
those who spend their entire working lives as teachers
within a particular salary . ck. No attempt has been
made to incorporate the efi.c ; of inflation and economy
wide productivity increases on the earnings profiles
Also, since we are computing all present values back to
age 25, and do not take opportunity cost into account we
are obviously not making any attempt to analyze the invest-
ment decision of whether it pays a teacher to earn a master's
degree.

The average of the values for all 93 school districts
of the constant yearly incomes that would generate present
values equal to those computed from the 1972-73 salary
schedules at 0, 5 and 10 percent discount rates are indicated,
together with relevant figures on dispursion in the following
table.

Table 9

Indices of Present Values

PV Calculated at a Discount Rate of	Average Values		Standard Deviation		Coefficient of Variation	
	BA Track	MA Track	BA Track	MA Track	BA Track	MA Track
0%	$10,915	$12,289	$1,470	$1,523	.135	.124
5%	10,338	11,576	1,319	1,397	.128	.121
10%	9,784	10,899	1,133	1,379	.116	.117

Source: Computed from data in National Education Association,
Salary Schedules and Fringe Benefits for Teachers, 1972-73
op. cit.

The simple correla on coefficients computed for the
indixes of present value and between these indices and the
scheduled maximum and minimum salaries for those with BA
and MA degrees are reported in the last six rows of Table 8.
It is apparent from these data that the measures of the
present values of the salaries offered to those within each
of the tracks computed at different discount rates are very
highly correlated with one another. The simple correlation
coefficients range from .98 to 1.0. Therefore, it seems

reasonable to use throughout the rest of the analysis just
one measure of present value rather than all three measures.
Accordingly we will represent the lifetime incomes
presumably promised by the tracks   in each schedule by
the constant values of yearly income which would give the
same present values, when discounted at %5 rate of interest,
as do the salaries scheduled in each of the BA and MA tracks,
when they are discounted at that rate.[23]   These measures
will be labeled on PVBA and PVMA respectively.

As Table 8 shows, PVBA and PVMA (represented in the
table as $PVBA_5$ and $PVMA_5$) are very highly correlated with
the maximum scheduled salaries in their respective tracks.
Across the school districts, the simple correlation coefficients
between the present value measures and maximum schedules
salaries are .98. These lifetime earnings measures are

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[23]The salaries prescribed by the schedules on basis
of experience and education do not take into account annual
increases in economy wide productivity, increases which
presumably would lead to annual salary increases of 2-3%.
Accordingly, in terms of lifetime earnings which incorporate
such   annual productivity generated increases, the discount
rate of 5% amounts to an implicit discount rate of 7 or 8%.

less well correlated with starting salaries. The correlation between PVBA and the corresponding starting salary is .89. For PVMA it is .85. The lifetime earnings for those in the BA track are correlated positively with the number of steps. For the MA track the correlation is negative. Lastly, we note that the correlation between the lifetime earnings measures for the BA and MA tracks is .89.

Let us summarize what the data examined to this point seem to indicate. There is some variation in the relative salaries offered by particular districts to those with different levels of experience and formal training. But there are clear limits to the variation. Thus if for those with a certain level of experience and formal training a salary schedule for a particular district mandates relatively high salaries--i.e. salaries that are high in comparison with those paid to teachers with similar qualifications employed in other districts--it is unlikely that the other teachers in the district will be scheduled to receive relatively low salaries, although they may not fare quite as well in comparison with comparably qualified individuals in other districts. For the sample of city school districts, the correlation among the salaries promised to those with maximum and minimum experience are relatively large, but they are by no means perfect.

The data in Table 10 make possible a more detailed
look at the interdistrict variation in the structure of
salary schedules. The table reports average values,
standard deviations and coefficients of variations for four
measures of extra pay for experience and for two measures
of extra pay for education. (These data pertain to our sample
of 93 school districts discussed above.) Table 11 shows
correlations among the six measures described in Table 10
and correlations of these measures to the salary measures
described previously.

The data in Table 11 indicate that, for particular
educational tracks, the differences between the measures
of lifetime earnings and starting salaries (e.g.(PVBA)-(BA-))
are very closely related to the differences between maximum
scheduled salaries and starting salaries. For the BA track
the correlation for these two measures is .97: for the MA
track the corresponding figure is .96. Extra pay beyond
starting salary (essentially extra pay for experience) for
those with a BA degree does not vary so closely with extra
pay beyond starting salary for those with an MA degree.
The correlation coefficient between the full differential
for experience in the BA track and the equivalent differential
in the MA track is .75; the correlation coefficient between
the two other measures of extra pay in each track, i.e.
[(PVBA) - (BA-) and ((PVMA) - (MA-))] is .78.

Table 10

Measures of Extra Pay for Experience and Education[*]

	Mean	Standard Deviation	Coefficient Variation
(BA+)(BA-)	$3,955	1131	.286
(MA+)-(MA-)	4,741	1128	.238
(PVBA)-(BA-)	2,818	772	.274
(PVMA)-(MA-)	3,296	808	.245
(MA+)-(BA+)	1,546	884	.572
(MA-)-(BA-)	760	296	.389

[*]

(BA+)-(BA-)	The difference between the maximum and minimum scheduled salary for a person with a bachelors degree.
(MA+)-(MA-)	The difference between maximum and minimum scheduled salary for a person with a masters degree.
(PVBA)-(BA-)	The difference between the index of present value and starting salary for a person with a BA degree.
(PVMA)-(MA-)	The difference between the index of present value and starting salary for a person with an MA degree.
(MA+)-(BA+)	The difference between the maximum scheduled salary for a person with a master's degree and the maximum salary for a person with a bachelor's degree.
(MA-)-(BA-)	The difference between the scheduled starting salary for a person with a master's degree and the starting salary for a person with a bachelor's degree.

Source: Computed from data in National Education Association, Salary Schedules and Fringe Benefits for Teachers, 1972-73, op. cit.

Table 11

Correlation Coefficients--Dimensions of Salary
Schedules and Measures of Extra Pay for Experience and Education

	BA-	BA+	MA-	MA+	#BA	#MA	PVBA	PVMA	(PVBA)-(BA-)	(PVMA)-(MA-)	(BA+)-(BA-)	(MA+)-(MA-)	(MA+)-(BA+)	(MA-)-(BA-)
BA-	1													
BA+	.83	1												
MA-	.92	.75	1											
MA+	.80	.86	.81	1										
#BA	-.02	.27	-.13	-.02	1									
#MA	-.18	-.01	-.25	-.11	.84	1								
PVBA	.89	.98	.82	.88	.10	-.17	1							
PVMA	.85	.83	.88	.98	-.17	-.29	.89	1						
PVBA-(BA-)	.65	.94	.59	.80	.19	-.12	.92	.78	1					
PVMA-(MA-)	.59	.73	.57	.92	-.17	-.26	.76	.89	.78	1				
(BA+)-(BA-)	.59	.94	.52	.75	.41	.09	.87	.69	.97	.71	1			
(MA+)-(MA-)	.54	.75	.51	.92	.06	.01	.73	.84	.77	.96	.75	1		
(MA+)-(BA+)	-.04	-.24	.15	.30	-.54	-.18	-.16	.29	-.25	.37	-.32	.34	1	
(MA-)-(BA-)	.09	.03	.47	.27	-.28	-.22	.07	.34	.04	-.14	-.01	.08	.46	1

Computed from data in National Education Association, Salary Schedules and Fringe Benefits for Teachers, 1972-73, pp. cit.

The four measures of extra pay for experience are not too strongly related to starting salaries. The simple correlation coefficients between starting salary and (BA+)-(BA-), (MA+)-(MA-), (PVBA)-(BA-) and (PVMA)-(MA-) are .59, .54, .65 and .59 respectively. The correlation coefficients comparing the four measures of extra pay for experience and starting salaries for those with an MA are of similar magnitude. The measures of extra pay are much more strongly, but not nearly perfectly correlated with maximum salaries in the various tracks. The implication is that it is the variation in maximum salaries that is most important in determining interdistrict differences in extra pay for experience.
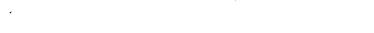
The relation between extra pay for experience and number of steps is positive for the BA track and negative for the MA track. That is, those districts with higher relative pay for experience for those with a BA degree raise the pay at least to some extent by including additional steps. Those districts with higher pay for experience for those in the MA track provide the higher pay despite having scheduled fewer steps.

Table 11 shows also correlations between the measures of extra pay for education, i.e. (MA+)-(BA-) and (MA-)-(BA-), and their relation to the other measures of teachers' salaries. These figures do not suggest, however, any pattern of

relationship that might be of special interest in the following
analysis of the impact of collective bargaining.

V

In this section we shall attempt to measure the impact
of collective bargaining on teachers' salaries. As our
previous discussion indicates, salary levels can be measured
in a variety of ways, depending on experience and education
of the teachers. Our attempt to measure collective bargaining
impact will take into account the basic measures i.e.
a minimum (or starting) and maximum salary for a teacher
with a B.A. degree; a minimum and a maximum salary for a
teacher with an M.A. degree; the previously described
measures of present values for these two educational tracks.
In addition we shall also try to estimate the impact of collective
bargaining on the structure of teachers salaries, i.e. on the
interrelation of the various salary measures, and on the
number of steps, within the B.A. and the M.A. tracks, between
a minimum and maximum salary.

Our basic assumption is that collective bargaining
exerts its impact by marking up or raising what would have
been--in the absence of unions or teachers' organizations--a
set of equilibrium salaries, i.e. salaries determined essentially
by market forces. But in so far as they are changed through
union activities the various measures of salaries need not
change either by the same percentage or by the same absolute
amount. Collective bargaining may thus not only change

the absolute levels of teachers' salaries but also their
structural interrelationship.

The data which we shall use pertain, as already indica
to 93 central city school districts in the largest Standard
Metropolitan Statistical Areas.   To isolate and
measure the impact of collective bargaining in these districts
we must standardize--as much as possible--for those charac-
teristics of the individual communities and labor markets
that would create inter-area differences in salary levels
and structure also in the absence of collective bargaining
and teachers unions. This we shall do by using the techniques
of multiple regression.

In formulating the regression which we will use we
are drawing upon models of teacher salary determination
developed and described elsewhere in the literature. In
particular, we draw upon a salary determination model in
which it is assumed that the goal of a school board is to
maximize the surplus value of produced education over
its cost, and in which the board achieves this goal by con-
tinuing hiring teachers until the value of marginal contribution
to the total output of education is equal to the marginal
cost of hiring an additional teacher.[24] Indeed our regressions

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[24]The model is described in M. O. Clement and A. L.
Gustman, Factor Cost Differences, Educational Equality, and
Funding Decisions in Public Education, op. cit.

may be viewed as modified version of reduced form equations
implied by this particular model. One reason for these
modifications is the assumed presence of collective bargaining
and its impact on salary levels and structure. But an equally
important reason reflects our view that even in the absence
of collective barga ing a school board has to be concerned
with salary issues that are ignored in a simple utility
maximizing model--issues of internal salary equity, of
maintaining a salary structure that contributes to the morale
of the teacher work force, etc.

In one important respect, however, our formulation of
the regression equation adheres closely to the assumptions
which underlie the previously mentioned model of teachers'
salary determinations. Specifically, as in the case of
that model, our formulation does not allow for the possibility
that, as a rule, school boards will be fixing salary levels
with a view toward improving--over and above the formal
educational requirements--the quality of the pool of applicants
for teaching positions.

What is the effect of omitting considerations pertaining
to teacher quality--other than formal educational training
and experience--in our formulations? There are some suggestions
in the relevant literature that particular characteristics
of teachers--e.g. verbal ability--may have an effect on

student learning.[25] We cannot standardize our sample for

such characteristics because we lack appropriate data. This

however is not necessarily a shortcoming since the school

boards themselves do not have at their disposal any reliable

indication of what makes for teacher quality. Indeed despite

the previously mentioned suggestions in the literature, it

appears that no single teacher characteristic bears an

important and consistent relationship to the educational

effectiveness of individual teachers.[26] As a result, there

is little or no evidence that school boards gear their salary

policies toward maximizing educational output through

variations in the quality of the teachers that they hire.[27]

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[25]H. M. Levin, "A Cost-Effectiveness Analysis of Teacher
Selection," Journal of Human Resources, Winter 1970.

[26]See H. A. Averch et. al. How Effective is Schooling,
Report to the President's Commission on School Finance,
the Rand Corporation, 1971.

[27]See, for example, J. D. Owen, "Towards a Public
Employment Wage Theory: Econometric Evidence on Teacher
Quality," Industrial and Labor Relations Review, January 1972.
Using data from the Coleman Report, Owen tested the hypothesis
that the school boards' demand for teachers is a positive
function of teacher quality, as measured teacher verbal scores.
The test showed no support for the hypothesis. Levin's
calculations of the marginal products (measured in terms of
student verbal scores) per dollar spent on various "quality"
related teacher characteristics also suggest absence of any
maximizing behavior on the part of the school boards in the
sample (Levin, op. cit.).

It is obvious from the salary schedules that school
boards pay higher salaries for increased experience and for
greater educational attainments. But for a number of reasons
it does not appear likely that the salary differentials
paid for experience and educational reflect primarily the
school boards' desire to structure salaries in accordance
with the educational effectiveness of individual teachers:

a. For many school districts, the steps within each
salary schedule mandate increases that, for each of the years
of experience up to a maximum, are similar in either percentage
or in absolute terms. Experience beyond the maximum does
not result in any further increment in pay. The obvious
question raised by these schedules is: Are productivity
gains really similar for teachers in each of their first
twelve years and zero after that? Neither a priori nor
empirical considerations suggest such a relationship.

b. It seems unlikely, given the wide variation among
school districts in the pattern of payments for experience,
that such differences as exist could reflect the effects
of interdistrict differences in the relative productivity
of teacher experience. For example, the number of steps
prescribed by the schedules in our sample range from a low
of four steps to a high of twenty-five steps.

c.   Between 1960 and 1972, in over half of the central
city school districts the number of steps was reduced. We
are not aware of any systematic forces operating over this
period that would act to reduce the amount of experience
at which teacher productivity peaks. Rather, field interviews
suggest that reducing the number of steps until maximum
salary is achieved is a subtle and perhaps politically
acceptable strategy by which the unions can gain salary
increases for the many teachers who have yet to reach the
maximum. In what is always a leading district, New York
City, the number of steps in the salary schedule has been
reduced from twelve in 1960 to seven in 1972, for example.

d.   School boards do not normally grant full credit
for experience gained in teaching outside the school district.
To be sure, the value of experience may in part be specific
to the background of the students taught. Nevertheless, it
seems unlikely that the specific nature of some experience
provides an adequate explanation for the kind of credit that
is in fact granted by school boards for experience gained
outside the district. The boards, where they are free to
choose, behave as if the current official price for teachers
with significant amounts of accumulated experience is too
high given the productivity differential between experienced
and inexperienced teachers.

In our view the salary differentials based on differences
in teachers' experience and education derive primarily from
the need for a salary structure that is based on objective
standards considered as equitable by both the school boards
and the teachers. Analogously to the case of an internal
wage structure in a private firm, such a salary structure
contributes to the maintenance of workable personnel relations
by limiting managerial perogatives with respect to the
sensitive area of salary diffential within the teacher
work force. While an adoption of a formal salary structure
may contribute to teachers' productivity by affecting
favorably their attitudes toward work, it also has inevitable
costs since it limits school boards ability to pay in
accordance with productive contributions of individual teachers.
For example, as Kershaw and McKean point out, because of a
single salary schedules school boards are unable to adjust
pay in accordance with relative scarcity of teachers by field
and training.[28]

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[28]J. A. Kershaw and R. N. McKean, Teacher Shortages
and Salary Schedules, New York, 1962.

It is .:levant to the following discussion to note in this context that the adoption of formal salary structures was brought about by teachers associations, and predates institutions of collective bargaining. This is, of course, a reflection of the fact that many pressures experienced formally through collective bargaining exist also in non-union situations.

The independent variables which we will use to standardize for the effects on teachers' salaries of factors, other than collective bargaining, cannot be classified neatly as related only to the demand for teachers or to their supply.[29] To be sure, some of these variables are related primarily to the demand side and some primarily to the supply side. But other variables bear relation to both sides of the market, and still others are important because they reflect not only the forces of supply and demand but also the institutional environment which affects specific policies of teachers' organizations and of the school boards.

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[29] This means, of course, that attempts to use multiple regression results to isolate the influence of demand and supply factors on interarea differences in teachers' salaries can provide, at best, only approximate answers. But in the present context what counts is standardizing for the effects on salaries resulting from both supply and demand related factors. For our purpose there is no need to disentangle the separate effects of supply and demand related factors from each other.

The independent variables in our regression predominantly related to demand are a measure of value of taxable property; proportion of public school revenue from federal sources; and proportion of public school revenue from state sources. The independent variable predominantly related to supply is a measure of what may be viewed as opportunity cost for teachers in each area. This measure is a weighted average of the area's salaries paid to males employed in professional and managerial occupations and to females employed as registered nurses.[30]

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[30]The weights are the numbers of male and female teachers in the area. This variable is meant to measure the combined effects of real wage differences, cost of living differences, and the relative nonprecuniary aspects of employment in different communities. Intercommunity differences in real wages paid to those in occupations that are a substitute for a teaching career will, if teachers are less than perfectly mobile be reflected in their salaries.

Many teachers are part of a two-earner family. For these teachers the cost of moving to a higher paying position in another community is likely to include the cost of relocating the second earner in the family. This cost may be an important factor acting to limit the geographic mobility of teachers. The relevant statistics on the labor force status of the teachers' spouse are as follows: Two-thirds of the teachers' labor force is composed of women. Two-thirds of women teachers are married, with 83 percent of their husbands employed full time. In the case of the 78 percent of the male teachers who are married, one-third of their wives work full time. (National Education Association, The American Public School Teacher, 1965-66, Washington, D.C., 1967, pp. 39-40.)

Several of the independent variables bear a relation
to both the demand and supply sides. Community income which
is an important determinant of the area's socio-economic
status bears a relation to the willingness and ability of
those in the area to pay for education and of the productivity
of expenditures per student. At the same time teachers
generally prefer employment in relatively high socio-
economic areas.[31] Population and enrollments are related
to demand because they reflect the relative needs among
the communities for teachers, the possible economies of
scale in producing education, and the effects of relative
class size on educational output.[32] But relative class size
may bear also relation to teachers' preferences for employment
in particular areas.

Some of the other independent variables pertain to the
market and institutional environment in which the school
boards and the teacher organizations conduct their policies.

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[31]John D. Owen, "The Distribution of Educational
Resources is Large American Cities," Journal of Human Resources,
Winter 1972.

[32]In the model from which the equation which we estimate
has been essentially derived enrollments appear as an independent
variable in the demand for education equation, and together
with the number of teachers, in the production function for
education. Solving the derived demand equation together with
the equation for supply of teachers and substituting for
the number of teachers yields the reduced form equation
which we actually estimate. The number of teachers does not
appear explicitly in this reduced form equation.

The findings of previous studies suggest that the process
of salary determination may be affected by a relative degree
of competition among the buyers of teachers' services.[33]
To standardize for the differences in the market structure,
we include as independent variables a measure of the number
of school boards in each of the SMSA's in the sample, and a
measure of the relative population in the central city areas
of each SMSA. We also include a dummy variable to measure
whether the school district in a given central city area is
financially dependent on or independent from the local
municipal government. Presumably, both the salary policies
of school boards and the process of collective bargaining
may be affected by the financial structure of the school
district.[34] In addition we also have as one of our independent
variables an index, developed by Kochan, which indicates how
favorable the legal environment in a given state is to the
conduct of collective bargaining by public school teachers.[35]

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[33]J. H. Landon and R. N. Baird, "Monopsony for Public
School Teachers," American Economic Review, December 1971.

[34]C. R. Perry and W. A. Wildman, The Impact of Negotiations
in Public Education: The Evidence from the Schools, Worthington,
Ohio, 1970 pp. 142-43.

[35]Thomas A. Kochan, "Environmental Correlates of Public
Sector Bargaining Laws," Industrial Relations, October 1973.

To the extent that the laws pertaining to the public sector
employees reflect the general industrial relations environment
of the state, they influence teacher salary determination
under both union and nonunion conditions.

The final independent variables measure the percentage
of teachers with an M.A. degree in the workforce of a given
area and the average age of the teachers. This latter
variable is used as a proxy for experience.[36] These
variables are important because for a given structure of
salaries they determine the structure of costs (to the school
boards) and of renumeration. In addition, the education and
experience structure of the teachers work force will determine
the present value of the future costs and remunerations

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[36]In 1966, the average age of teachers reporting to
the NEA was 38.7 years. Average experience was 11.8 years,
with 8.1 years in the same school district. Median years
of age and experience were 36.0 and 8.0 years respectively,
with a median of 5.0 years spent in the same school district.
(National Education Association, The American Public School
Teachers, 1965-66, Washington, D.C. 1967, pp. 12 and 37.)

The teachers employed in the 93 central city districts
in 1970 were somewhat younger than those responding to the
1966 NEA Survey. Specifically, the average teachers' age
for the central city districts is 35.6 years, three years
below the average for the NEA. Given the average of about
12 steps in an educational track, it would appear that an
average teacher in our sample is probably two or three steps
below the step for the maximum salary.

implied by a given salary structure.[37]   Another reason
for including these variables is that the pressures to bring
about what the area's teachers would view as "equitable"
salary structure are likely to be determined both by the
educational and by the experience composition of the work
force.

We recognize that the experience and educational composition
of the area's teachers is likely to depend on a variety of
factors including such pehnomena as the past history of
growth in the area, the available opportunities for post
B.A. education and others. Importantly, it may also depend
on the specific characteristics of the salary structure. To
the extent that this is so, the two variables should be viewed
as endogenous to the various equations estimated below and,
as a result, the coefficients on these variables will be biased.

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[37]An example of the influence of experience and education
on the formation of a salary structure is provided by the
suburban public school districts which, given relatively
unexperienced work force, heavily dominated by new B.A.'s,
would fix relatively high maximum salaries in the hope
of attracting larger pools of applicants. Such policies would
obviously have little effect on current costs. The example
was given to us by an official teacher of a organization in
the state of New York.

The impact of teachers unions or organizations is measured by two dummy variables. These variables are used to distinguish two types of union contracts. One dummy variable takes on a value of one if the agreement is a comprehensive agreement and a value of zero otherwise. A comprehensive agreement is the most formal type of an agreement and usually implies a contract which spells out in relatively great detail the conditions of employment. Comprehensive agreement are part of a wider category of contracts termed negotiation agreements. Those negotiation agreements which are not comprehensive are generally much less specific in spelling out the terms of teachers' employment. The second dummy variable which we employ takes on a value of one if the agreement is negotiatable but not comprehensive and a value of zero otherwise. With these specifications the coefficients estimated for each of the two variables will represent: (a) the effect of a comprehensive agreement as compared with a situation where there is no agreement at all; and (b) the effect of a negotiation agreement which is not comprehensive as compared with a situation where there is no agreement at all.[38]

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[38] For a description of agreements see National Education Association, Negotiation Agreements Provisions for Teachers, Washington, D.C. 1972.

It will be recognized that this formulation assures that the impact of the union is not affected by the values of the other independent variables, i.e. that the effect of union contract is to change the intercept but not the slope of the underlying wage related regression.

How will collective bargaining affect the various
measures of salaries and their structure which we use as
dependent variables in our regression? Relevant literature
and our field interviews suggest that the most active members
of teachers organizations are typically those with some
years of experience and those with an M.A. degree.[39] One
would therefore expect that a union would concentrate much
of its attention in bargaining on making the kind of changes
in the salary structure that wold be beneficial to that
group. This tendency is likely to be strengthened by two
other factors. First because of laws eventually requiring
it and for other reasons most teachers expect eventually
to get an M.A. degree.[40] Second, the typical pattern is to

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[39]Perry and Wildman op. cit. p. 155. The authors also
indi_a that these active members are typically male and
teach ac the high school level. However the concept of a
single salary schedule limits the possibility of special
gains r those who are male or teach in high schools.

[40]For data on educational requirements necessary to
obtain a permanent teaching license see T. M. Stinnett,
A Manual on Standards Affecting School Personnel in the
United States, 1974 Edition, NEA, Washington, 1974 pp. 12-23.
See also E. F. Kirk, A Theoretical and Empirical Study of
the Impact of Collective Negotiations on Public School Teachers'
Salaries in the Commonwealth of Massachusetts, Unpublished
Ph.D. Dissertation, Boston College, 1974 p. 146.

earn such a degree while working, i.e. while accumulating

some experience.[41] The implication thus is that raising

the pay for those with an M.A. degree who have accumulated

some experience would constitute a union policy popular with

overall membership.

Taking into account the factors that underlie union

.. :ies and also other pressures that focus on school

boa. s suggests a number of possible effects of collective

i.i gaining on the various aspects of the structure of teachers

salaries.

Starting salaries are the part of salary structure that

are most easily perceived by the public, and negotiated

increases in such salaries are usually publicly announced.

Thus in so far as the public is concerned about high levels

of public employee laries the school board would be under

relatively greatest pressure to keep the starting salaries

down. Moreover, by their very nature starting salaries are

likely to be of lesser interest to those currently employed--and

that means current membership of teachers organizations--than

other parts of salary structure. As a result, one would

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[41]It has been suggested that most teachers obtain their
M.A. on a parttime basis because the additional earnings are
not high enough to justify investing a full year of foregone
earnings at the beginning of their career. See C. Friedman,
"Education of New York City Public School Teachers: An
Economic Analysis," Industrial and Labor Relations Review
October 1964.

expect that the impact of collective bargaining on teachers'
starting salaries should be weaker than elsewhere.

Changes in maximum salaries and in the number of steps
in each educational track are likely to be less easily
perceived by the public than those pertaining to starting
salaries. And it is obvious that these changes are of greatest
importance to the teachers currently employed. Increases in
the maximum salary bring an immediate benefit to those who
have already reached the highest steps; and, other things
the same, they raise the size of the average annual increase for
those with less than a maximum salary, and also raise the
value of their lifetime earnings. A reduction in the
number of steps in a salary track benefits those who have
not yet reached the maximum in two ways. First, it increases
expected future earnings. Second, it raises the value of
their current increases. Except for individuals who are
only one step away from the maximum, the salary increases
gained as a result of reduction in the number of steps
are greater the closer the particular individuals are to
the maximum.[42] For example a person who is two steps away
from the maximum at a time when the number of steps is reduced
will receive twice the increase that he would have received
if there had been no change.

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[42]As pointed out in footnote 36 an average teacher in our
sample is likely to be more than one steps below the maximum
salary.

Another change in salary structure that could benefit
current union membership would be increasing the maximum
salary by adding a step in a particular track. Since this
would not raise the size of an average step, the overall
benefit would not be as great as that of raising the maximum
without changing the number of steps. And, similarly, in
contrast to a measure that would reduce the number of steps,
it would not affect the current increases of those who
have not reached the maximum step. For these reasons,
despite its obvious benefits the policy of increasing the
maximum by adding a step is not likely to be the most
attractive to overall membership.

The union is likely to have interest in raising the
salaries scheduled for those with all levels of experience--educa-
tion qualifications. But the preceding discussion suggests
that the impact of collective bargaining is likely to be
particularly reflected in the salaries of those with an
M.A. degree, and with several years of experience. With
respect to the measures of salary structure described previously
this would mean a particularly marked impact on the spread
between maximum and minimum pay for an M.A. degree. By the
same token this would also imply an impact on the difference
between the maximum salary for an M.A. degree and a maximum
for a B.A.

The impact of collective bargaining on the pay of the M.A.'s with some experience also means that collective bargaining is likely to raise the present value of pay beyond the starting salary in the M.A. track. In so far as collective bargaining also reduces the number of steps between the starting and the maximum salary, it further increases the value of this measure of pay for experience. On the other hand, if collective bargaining increases the number of such steps its overall impact on this measure would be weakened.

In Table 12 we present results of a series of regressions in which we tried to isolate the impact of collective bargaining on the measures of teachers salaries and their structures that have been discussed previously. (The figures in parantheses are t-ratios) Following the table is a list of dependent and independent variables and their sources.

As can be seen in Table 12 most of the equations estimated for the various measure of teachers salaries and their structures have $\bar{R}^2$'s that can be considered satisfactory for cross section data. The regressions explain best the measures for salary levels, generally accounting for 55% or more of the variance. The equations for salary structure account for between 1/3 to 1/2 of the variance, and those for the number of steps, in the two educational tracks are least satisfactory. In a sense these results are not surprising since our independent variables were primarily designed to explain salary levels.

Table 12

Empirical Estimates--The Impact of Collective Bargaining on Teachers' Salaries
93 Central City School Districts, 1972
(t-ratios are in parentheses)

	BA-	BA+	MA-	MA+	#BA	#MA	PVBA	PVMA	(BA+)-(BA-)	(MA+)-(MA-)	(PVBA)-(BA-)	(PVMA)-(MA-)	(MA+)-(BA+)	(MA-)-(BA-)
INT	8710.64 (6.67)	23073.2 (6.19)	7190.16 (4.96)	19879.1 (5.73)	35.267 (3.63)	24.0268 (2.81)	17475.8 (6.51)	15146.9 (5.71)	14362.8 (4.57)	12688.4 (4.54)	8767.64 (4.33)	7958.7 (4.18)	-3194.45 (-1.28)	-1520.17 (-1.89)
ENR	.002905 (1.28)	.0057857 (.89)	-.021349 (-.85)	-.003646 (-.61)	.0000233 (1.38)	.00001444 (.97)	.00341897 (.73)	-.004669 (-1.01)	.00288 (.53)	-.0015124 (-.31)	.000514 (.15)	-.0025345 (-.77)	-.00943311 (-2.18)	-.00504002 (-3.61)
POP	-.000406 (-1.10)	-.0006947 (-66.)	.0004490 (-1.09)	.00062261 (.63)	-.00000329 (-1.2)	-.000002472 (-1.02)	-.00036626 (-.48)	.0008289 (1.11)	-.000288 (-.32)	.00017366 (.22)	.0000397 (.07)	.0003798 (.7)	.00133739 (1.87)	.000855107 (3.76)
INC	.0030607 (.04)	-.0448167 (-.19)	-.0138337 (-.15)	.0130253 (.06)	.00041843 (.69)	.00032997 (.62)	.053133 (-.32)	-.036675 (-.22)	-.047866 (.24)	.0268868 (.15)	.056259 (-.44)	-.022867 (-.19)	.0578556 (.37)	-.0168938 (-.34)
ST REV	3.55017 (1.00)	-3.4840 (-.93)	6.97892 (.177)	-2.36678 (-.25)	-.0191856 (-.73)	-.0159256 (-.68)	-5.18678 (-.71)	1.5112 (.21)	-13.034 (-1.52)	-9.34595 (-1.23)	-8.73531 (-1.59)	-5.46661 (-1.05)	7.1172 (1.05)	3.42911 (1.57)
FED REV	10.1171 (.68)	16.2261 (.38)	16.6592 (1.01)	-5.13769 (-.13)	.041237 (.37)	-.055134 (-.57)	15.2686 (.5)	3.75618 (.13)	6.09862 (.17)	-21.7939 (-.69)	5.13038 (.22)	-12.9108 (-.6)	-21.3616 (-.76)	6.53178 (.72)
PROP	33.5772 (1.41)	57.3602 (.84)	41.854 (1.59)	82.6635 (1.31)	-.0916907 (-.52)	-.04655) (-.3)	53.4054 (1.09)	75.1317 (1.56)	23.7827 (.42)	40.8052 (.8)	19.8346 (.54)	33.2808 (.96)	25.2992 (.56)	8.27616 (.57)
OP COST	.059717 (.60)	-.218877 (-.77)	.374106 (3.38)	.369643 (1.39)	-.0018659 (-2.51)	-.0010620 (-1.62)	-.05457 (-.27)	.454012 (2.24)	-278628 (-1.16)	-.0044615 (-.02)	-.114329 (-.74)	.079827 (.55)	.588545 (3.1)	.314383 (5.12)
AGE	-77.3654 (-2.79)	-300.39 (3.8)	-78.5609 (-2.55)	-316.307 (-4.3)	-.30467 (-1.48)	-.116671 (-.64)	-213.195 (-3.74)	-231.357 (-4.11)	-223.027 (-3.34)	-237.789 (-4)	-135.875 (-3.16)	-152.879 (-3.78)	-15.916 (-.3)	-1.15191 (-.07)
#MA	3.27353 (.76)	20.165 (1.65)	2.5098 (.53)	16.0103 (1.41)	.0412453 (1.29)	.0466202 (1.66)	13.5616 (1.54)	7.71468 (.89)	16.8916 (1.64)	13.5001 (1.47)	10.2896 (1.55)	5.20624 (.83)	-4.15485 (-.51)	-7.63487 (-.29)
DEP	447.673 (4.36)	552.074 (1.88)	525.395 (4.61)	232.427 (.85)	-.7461 (-.98)	-.902521 (-1.34)	587.518 (2.78)	403.506 (1.94)	104.39 (.42)	-292.866 (-1.33)	139.813 (.88)	-121.828 (-.81)	-319.643 (-1.64)	77.6167 (1.23)
NO	8.85061 (4.04)	14.0539 (2.25)	6.74984 (2.78)	12.5744 (2.13)	-.012964 (-.8)	-.0090219 (-.63)	13.4155 (2.98)	11.5625 (2.6)	5.20322 (.99)	5.62449 (1.2)	4.5647 (1.34)	4.81247 (1.51)	-1.67957 (-.4)	-2.10085 (-1.56)
CC	-5.49846 (-1.57)	-17.7942 (-1.78)	-6.91285 (-1.78)	-16.1756 (-1.74)	-.0126391 (-.48)	.0053496 (.23)	-.13.1466 (-1.82)	-13.5666 (-1.91)	-12.296 (-1.46)	-9.26297 (-1.23)	-7.64833 (-1.41)	-6.65463 (-1.3)	1.61864 (.24)	-1.41447 (-.66)

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Table 12 Cont.

	BA-	BA+	MA-	MA+	#BA	#MA	PVBA	PVMA	(BA+)-(BA-)	(MA+)-(MA-)	(PVBA)-(BA-)	(PVMA)-(MA-)	(MA+)-(BA+)	(MA-)-(BA-)
LAW	30.1662 (3.74)	51.8902 (2.26)	21.6459 (2.42)	35.0855 (1.64)	-.0078428 (-.13)	-.025092 (-.48)	48.3281 (2.92)	34.7211 (2.12)	21.7239 (1.12)	13.4391 (.78)	18.1604 (1.45)	13.0742 (1.11)	-16.8056 (-1.1)	-8.52087 (-1.72)
COMP	49.0774 (.39)	163.908 (.46)	11.2744 (.08)	613.265 (1.89)	-1.46842 (-.56)	-1.43899 (-1.74)	219.657 (.85)	533.272 (2.08)	114.841 (.38)	601.977 (2.23)	170.628 (.87)	522.042 (2.84)	449.339 (1.87)	-37.8003 (-.49)
NEG-COMP	-142.287 (-1.07)	-339.001 (-.9)	-179.774 (-1.22)	98.5211 (.76)	-2.53133 (-2.57)	-2.45332 (-2.83)	-138.898 (-.51)	199.304 (.74)	-196.7 (-.62)	278.279 (.98)	3.46336 (.02)	379.148 (1.96)	437.502 (1.73)	-37.4827 (-.46)
$\bar{R}^2$ (S.E.)	.690922 (378.533)	.560865 (1079.87)	.700231 (419.817)	.632977 (1004.25)	.15143 (2.81615)	.150759 (2.47723)	.651976 (778.061)	.698042 (767.752)	.353115 (909.922)	.483811 (810.156)	.4235 (586.401)	.534003 (551.664)	.336741 (720.246)	.383843 (232.553)

Dependent Variables*

BA- -- Salary for a teacher with a BA degree and no experience.
BA+ -- Maximum salary for a teacher with a BA degree.
MA- -- Salary for a teacher with an MA degree and no experience.
MA+ -- Maximum salary for a teacher with an MA degree.
#BA -- Number of steps in the BA track.
#MA -- Number of steps in the MA track.
PVBA -- Constant level of yearly income that will generate the
        present value of the BA track at 5% interest.
PVMA -- Constant level of yearly income that will generate the
        present value of the MA track at 5% interest.
(BA+)-(BA-) -- The difference between the maximum and minimum
               scheduled salary for a person with a bachelors
               degree.
(MA+)-(MA-) -- The difference between maximum and minimum
               scheduled salary for a person with a master's
               degree.
(PVBA)-(BA-) -- The difference between the index of present
                value and starting salary for a person with
                a BA degree.
(PVMA)-(MA-) -- The difference between the index of present
                value and starting salary for a person with
                an MA degree.
(MA+)-(BA+) -- The difference between maximum scheduled
               salary for a person with a master's degree
               and a maximum scheduled salary for a person
               with a bachelor's degree.
(MA-)-(BA-) -- The difference between minimum scheduled
               salary for a person with a master's degree
               and a minimum scheduled salary for a person
               with a bachelor's degree.

Independent Variables

INT -- Intercept term.
ENR -- Number of enrollments in public schools. (Census of
       Population: 1970, General Social and Economic
       Characteristics, Nos. 2-52, Table 83 and Table 120.)
POP -- Population of central city (or central county).
       (Census of Population: 1970, Number of Inhabitants,
       U.S. Summary, Tables 31 and 32.)
INC -- Median family income. Census of Population: 1970,
       General Social and Economic Characteristics, U.S.
       Summary, Table 188 and Table 44.
STREV -- Proportion of public school revenue from state sources.

(Office of Education, ELSEGIS III, PART B -- FINANCES: 1969-70.
Data tape. Variable D on the tape as a percent of the sum
of tape variables $(C + B_{14} + D + E_{15})$.

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* Source: National Education Association, Salary Schedules
and Fringe Benefits for Teachers, 1972-73; op. cit.

FED REV -- Proportion of public school revenue from federal
sources. (U.S. Office of Education, ELSEGIS III,
PART B -- FINANCES, 1969-70, Data tape. Variable
E_{15} on the tape calculated as a percent of the
sum of tape variables $(C + B_{14} + D + E_{15})$.

PROP -- Market value of taxable real property per capita.
(Calculated as the ratio of assessed value of all
real property subject to local general property
taxation divided by the aggregate assessment-
sales price ratio of measurable sales of all types of
real property, divided by 1970 population. Where in
certain cases, central city data were not available,
county data were used. Census of Governments: 1972,
Volume 2, Taxable Property Values and Assessment
Sales-Price Ratios, pt. 1, Table 4 and pt. 2, Table II.)

OP COST -- Opportunity cost for public school teachers--a
weighted average of the wage for female registered
nurses and male professional technical and kindred
workers. (Weights used are the percentages of
female teachers, Census of Population: 1970,
Detailed Characteristics, Nos. 2-52, Table 173
and Table 176 and General Social and Economic
Characteristics, Nos. 2-52, Tables 89 and 122.

AGE -- Median teachers' age--a proxy variable for years of
experience. (Census of Population: 1970, Detailed
Characteristics, Nos. 2-52, Tables 173 and 174.)

MA -- Proportion of Teachers with an M.A. or higher degree.
(Office of Education, Statistics of Local Public School
Systems, Fall 1969: Pupils and Staff, Table 4.

DEP -- Dummy variable with value of 1 if school district is
fiscally dependent, O otherwise. (Census of Governments:
1967, Vol. 4 No. 1, Table 8 and Vol. 5.)

NO -- Number of school districts operating in the SMSA. (This
number is the sum of the number of operative districts
in each component county (or part of county) of the
SMSA. Census of Population: 1970, Number of Inhabitants,
Nos. 2-52, Table 13 and U.S. Summary, Table 32; Office
of Civil Rights, Directory of Public Elementary and
Secondary Schools, Fall 1968; Directory of Public
Elementary and Secondary Schools, Fall 1970; Office
of Education, Education Directory: Public School
Systems, 1969-70.)

CC -- Proportion of SMSA population that lives in a central
city. (Census of Population: 1970, Number of Inhabitants,
U.S. Summary, Tables 32 and 34.

LAW -- An index that is designed to measure state legal require-
  ments for recognition of and bargaining with teachers'
  organizations. (From Thomas A. Kochan, "Environmental
  Correlates of Public Sector Bargaining Laws," _Industrial
  Relations_, October 1973, pp. 322-34.

COMP -- Dummy variable, value of 1 indicates the existence of
  a comprehensive agreement, 0 otherwise.

NEG-COMP-- Dummy variable, value of 1 indicates the existence
  of a negotiation agreement which is not a comprehensive
  agreement. (N.E.A., _Negotiation Agreements Provisions
  for Teachers, 1972 Edition; Part I, Scope of Agreement
  and Association, Board of Trustee Rights Provisions_,
  pp. 1-63.)

The t-statistics for the first seven variables in the
regressions--those labeled as reflecting primarily the
forces of supply and demand--indicate in a number of cases
that the coefficients are significantly different from zero.
This is particularly true for the measure of opportunity
cost which is significant in several equations pertaining
to the pay of those with an M.A. degree. But in general
the coefficients on the demand and supply variables estimated in the
various equations are not significant. F-tests indicate
that this group of variables adds significantly to the
explanatory power of the regressions in only three of the
fourteen regressions--the equation for the number of steps
in the B.A. track, the equation for (MA+)-(BA+) and the
equation for (MA-)-(BA-).[43] As pointed out later, the demand
and supply variables played a much more important role in
1960, i.e. before the advent of formal collective bargaining.

   The data in Table 12 indicate that the age variable is
significantly and negatively related to all measures of

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[43]The F-statistics, in order of the regressions in
Table 12, with 7 and 77 degrees of freedom, are: .4408;
.3073; 1.8143; .6348; 3.5821; 2.1089; .2287; .8421; .8994;
.6030; .6871; .5136; 4.9986; 9.4665.

levels of teachers' salaries and also to salary differentials
associ   with accumulated experience (e.g. (BA+)-(BA-)).
In other words, where teachers are younger, both scheduled
salaries and rewards for experience are relatively high.
One reason is likely to be that relatively young age of
teachers reflects recent growth of employment in the district
or conditions that encourage high turnovers, i.e. factors
that put upward pressure on salaries. This is also the
result that is suggested by cost considerations. Obviously,
it is relatively inexpensive to establish high salaries
for experience in a situation where only a few teachers have
accumulated many years of teaching.

The variable indicating the percent of teachers with an
M.A. degree does not bear a significant relationship to
either salary levels or to the measures of salary structure.

The three variables which reflect the financial structure
and the competitive conditions of the labor markets in
individual areas are significantly related to the levels of
salaries but not to the differentials for experience or
education or to the number of steps in the two tracks. One
finding is that salaries paid by districts that are financially
dependent on local governments are higher than salaries
paid by independent districts. This appears to be consistent
with the general implication of the argument advanced by
Wellington and Winter, i.e. that public employees are likely

to be more successful in raising salaries the more difficult

it is for the public to discern the cost of the salary increase.[44]

In a dependent district increases in teachers salaries may

be only one of many causes leading to   tax   increase.

Another finding is that where there is more competition on

the demand side--i.e. where there is a large number of

districts in the SMSA and where the central city district

is small relative to the size of the surrounding SMSA--salaries

are higher.

In the case of the law variable, the results are similar

to the above. Where the legal environment is favorable to

collective bargaining by teachers, all scheduled salaries

are higher. However, the differential pay for additional

experience of for education is not significantly affected

by the legal environment.

The fact that the four variables measuring financial,

legal and competitive structure affect the levels but not

the structure of salaries appears to be quite reasonable.

There is nothing in these variables to suggest that they

should have a differential effect on the various elements

of the salary structure.

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[44]Wellington and Winter, op. cit. p. 31, 198-99.

We turn now to the findings pertaining to the impact
of collective bargaining. These findings are generally
consistent with the expectations that were based on some of
the relevant literature and on our field interviews.
Specifically, collective bargaining appears to affect most
strongly the salary measures which pertain to those with an
M.A. degree and some experience. With an exception of the
regressions for the number of steps--when it appears that
the unions reduce the number of steps in the two educational
tracks--comprehensive agreements have a much more pronounced
impact than negotiation agreements which are not comprehensive.

To facilitate our discussion we report in Table 13
the ratios of the estimated coefficients on the two measures
of collective bargaining to the mean values of the corresponding
dependent variables. Our discussion led us to believe that
collective bargaining is likely to increase the pay for
experience for those with an M.A. degree. The data indicates
that the pay for experience, as reflected in the spread
between the maximum and the minimum pay for a teacher with
an M.A. degree, is increased under a comprehensive agreement
by about 12.7% of the average spread for the sample.
Since, as the data show, collective bargaining also leads
to some reduction in the number of steps in the M.A. track,
it has an even greater effect on the present value of the
extra pay for experience. As can be seen, (PVMA)-(MA-)
is increased by 15.8%.

Table 13

The Impact of Collective Bargaini --In
Percentage Terms--On Components and   ures
of Teachers' Salary Structui

Dependent Variable	Type of Contract	
	Comprehensive	Negotiation, Not Comprehensive
BA-	.7%	-1.9%
BA+	1.4	-2.9
MA-	.1	-2.2
MA+	4.7*	.8
#BA	-12.9	-22.3**
#MA	-11.4*	-19.5***
PVBA	2.1	-?.5
PVMA	4.6**	1.7
(BA+)-(BA-)	2.9	-5.0
(MA+)-(MA-)	12.7**	5.8
(PVBA)-(BA-)	6.1	.1
(PVMA)-(MA-)	15.8***	11.5*
(MA+)-(BA+)	29.1*	28.3*
(MA-)-(BA-)	-5.0	-4.9

*Coefficient significant at 10 percent level.
**Coefficient significant at 5 percent level.
***Coefficient significant at 1 percent level.

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Comprehensive agreements appear also to have an impact
on the difference between a maximum M.A. salary and a
maximum B.A. salary. In dollar terms the average impact
amounts to about $450.00 which is $150.00 less than the
impact of collective bargaining on (MA+)-(MA-). But since
the average difference between a maximum pay for an M.A.
and a maximum pay for a B.A. is relatively small, Table 13
indicates a relatively large percentage impact of close to
36 percent.

What about the direct impact of comprehensive agreements
on the maximum salary of a teacher with an M.A. degree?
Starting salary constitutes almost two thirds of the total
amount of the maximum M.A. salary. This means that, in
so far as collective bargaining influences only pay for
experience, its overall impact on the total maximum salary
is going to be smaller than on (MA+)-(MA-). The impact
shown in Table 12 is 4.7%. The finding for the present
value of the salary scheduled for a person with an M.A.
(i.e. PVMA) indicates an impact of collective bargaining of
about the same size.[45]

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[45]It will be seen in Table 13 that the union impact on
PVMA is actually slightly less than on MA+. This is so
despite the fact that the union presumably also reduced the
number of steps in the M.A. track. The reason is that
collective bargaining has relatively small effect on the
M.A. salary paid during the first few years of tenure when
starting salary represents the greatest proportion of the
total salary. While these early years enter into the
calculation of PVMA they do not affect the maximum salary
of an M.A.

The data in the two tables indicate no significant impact of collective bargaining on starting salaries. In view of our previous discussion this is perhaps not surprising.

All told then, our findings indicate that collective bargaining does exert some impact on salaries of public school teachers. This impact is focused, however, on a limited number of characteristics of the salary structure--the number of steps in the B.A. and the M.A. tracks, and the renumeration of experienced teachers with an MA degree.

We should recognize that our findings may not reflect the full impact of collective bargaining on teachers' salaries. The reason is that there may be a spillover of union settlements' influence to unorganized areas. The findings indicate only the differential effect of the existence of a contract in particular areas; they do not show to what extent, if any, collective bargaining has affected salaries in those areas which do not have collective bargaining contracts but which have been affected by the spillover.

We can get further insight into the process of salary
determination of public school teachers by considering a
period prior to the establishment of formal collective
bargaining. Specifically we can use 1960 data for a sample
of 84 out of the 93 central city school districts which
were examined in our previous regressions.[46] The data are
fully comparable to those used for the year 1972.

The results of 1960 regressions for the same dependent
variables as those examined before are presented in Table 14.
From the set of independent variables we excluded, however,
the two measures of union contract and the measure of the
legal environment. As the table indicates, the demand and
supply related variables enter much more significantly into
the process of salary determination than in 1972. F-tests
indicate that these variables are, in fact, highly significant
as a group.[47]

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[46]The list of the 84 central city school districts is
in Appendix A.

[47]The values of the F-statistics for the twelve equations
(in the order of Table 14) are: 4.5039; 4.9951; 4.6023; 5.1777;
6.4305; 4.8110; 4.7145; 4.8819; 5.6845; 6.2333; 5.1767;
5.7428; 7.7680; 5.0081. With 7 and 71 degrees of freedom,
all of these are significant at the 1% level.

Dependent Variables*

BA- -- Salary for a teacher with a BA degree and no experience.
BA+ -- Maximum salary for a teacher with a BA degree.
MA- -- Salary for a teacher with an MA degree and no experience.
MA+ -- Maximum salary for a teacher with an MA degree.
#BA -- Number of steps in the BA track.
#MA -- Number of steps in the MA track.
PVBA -- Constant level of yearly income that will generate
      the present value of the BA track at 5% interest.
PVMA -- Constant level of yearly income that will generate the
      present value of the MA track at 5% interest.
(BA+)-(BA-) -- The difference between the maximum and minimum
          scheduled salary for a person with a bachelors
          degree.
(MA+)-(MA-) -- The difference between the maximum and minimum
          scheduled salary for a person with a masters
          degree.
(PVBA)-(BA-) -- The difference between the index of present
          value and starting salary for a person with
          a BA degree.
(PVMA)-(MA-) -- The difference between the index of present
          value and starting salary for a person with
          an MA degree.
(MA+)-(BA+) -- The difference between maximum scheduled salary
          for a person with a master's degree and a
          maximum scheduled salary for a person with a
          bachelor's degree.
(MA-)-(BA-) -- The difference between minimum scheduled
          salary for a person with a master's degree and
          a minimum scheduled salary for a person with a
          bachelor's degree.

Independent Variables

INT -- Intercept term.
ENR -- Number of enrollments in public schools. (Census of
     Population: 1960, General Social and Economic Charac-
     teristics, Table 73 and Table 83.
POP -- Population of central city (or central county).
     (Census of Population: 1960, Number of Inhabitants,
     U. S. Summary. Table 30 and Table 31.
INC -- Median family income. (Census of Population: 1960,
     General Social and Economic Characteristics, Vol. 1,
     Part 1 Table 154 and .ble 36.)

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*Source: National Education Association, Salary Schedules,
Classroom Teachers, Urban Districts 100,000 and Over in
Population 1959-6' and Salary Schedules, Classroom Teachers,
Urban Districts 30,000-98,000 in Population, 1959-1960, both
Table 6, Col. 5.

ST REV -- Proportion of public school revenue from state
        sources. (National Education Association, <u>Selected
        Statistics of Local School Systems 1960-61</u>, Table 6,
        col. 7.)
FED REV -- Proportion of public school revenue from federal
        sources. (National Education Association, <u>Selected
        Statistics of Local School Systems 1960-61</u>, Table 6,
        col. 8.)
PROP -- Market value of taxable real property per capita.
        (Calculated as the ratio of assessed value of all real
        property subject to local general taxation divided
        by the aggregate assessment-sales price ratio of
        measurable sales of all types of real property, divided
        by 1960 population. Data was gathered by county.
        <u>Census of Governments: 1962</u>, Volume 2, <u>Taxable Property
        Values</u>, Tables 21 and 22.)
OP COST -- Average of wage for female registered nurses and
        male professionals, weighted by percentage of
        male and female teachers employed full-time in
        the district. (<u>Census of Population: 1960, General
        Social and Economic Characteristics</u>, Tables 76,
        86, 124).
AGE -- Median teacher's age--a proxy variable for years of
        experience. (<u>Census of Population: 1960, Detailed
        Characteristics</u>, Tables 122 and 123).
MA -- Proportion of teachers with an MA or higher degree.
        (National Education Association, <u>Selected Statistics of
        Local School Systems 1960-61</u>, Table 6, cols. 15, 16, 17).
DEP -- Dummy variable with value of 1 if school district i
        fiscally dependent, 0 otherwise. (<u>Census of Governments:
        1962</u>, Vol. 4, No. 1, Table 8).
NO -- Number of school districts operating in the SMSA
        (<u>Census of Governments: 1962</u>, Vol. 5, Table 4).
CC -- Proportion of SMSA population that live in a central
        city. (<u>Census of Population: 1960, Number of Inhabitants</u>,
        Table 33).

The differing importance of the demand and supply variables in the 1960 and the 1972 regressions ᵴ not appear to be a result of purely mechanical factors. When the 1972 regressions are rerun for the 84 central city districts--to make the sample exactly the same as in the 1960 regressions--the results are essentially unchanged from those reported in Table 12. Moreover, the supply and demand related variables remained more significant in the 1960 regressions thᴂn in the 1972 regressions even when the two contract and the law variables were added to the independent variables in the 1960 regression or subtracted from the independent variables in the 1972 regression.[48]

One possible reason for the 1960-72 difference in the importance of the local supply and demand factors in the process of salary determination of public school teachers is the rise of collective bargaining. Specifically the presence of collective bargaining may create an awareness of the terms of the contracts signed in other areas and a tendency toward

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[48]When we added the contract and the law variables to the 1960 regression, these variables were generally not significant. A notable exception was the regression for the starting salary of a teacher with a BA degree. The implication is that there was some tendency for collective bargaining to develop in the areas where in the preunion period starting salaries were relatively high.

imitation. If that happens, the relation between the local
market forces and the salaries of public school teachers is
likely to be weakened. This tendency may be strengthened
by the increasingly active role played by national organiza-
tions of teachers.

Assuming that collective bargaining does, in fact,
account for weakening the influence of market forces, has
such weakening taken place only in those areas where formal
bargaining takes place or has the salary setting environment
been affected in all areas? To test whether supply and
demand variables played a different role in 1972 in union
areas from those in non-union areas we added a set of interaction
variables to the regressions reported in Table 12. These were
intereaction variables between the set of market variables
(i.e. the first seven variables reported in Table 12) and the
two measures of collective bargaining contracts. The F-tests
indicated that, in general, these interactions were not
significant.[49] These findings imply that in so far as the

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[49]The f statistics were in the order of the regressions,
as follows: .3454; .3095; .6892; .2438; .2950; .5678;
.3138; .3156; .9980; .4050; 1.858; 1.9112; .9493; .8217.

rise of collective bargaining weakened the influence of the
local supply and demand factors on the process of teachers'
salary determination, it had this effect both in cities
with formal contracts and in those without such contracts.

The rise of collective bargaining, however, is not the
only possible explanation for the weakening of the impact
of local market forces. It is possible, for example, that
in the twelve year period teachers have become more
mobile and that the boundaries of their labor markets have
widened accordingly. The result of such a change would be
lesser influence of the local supply demand factors.
Another possible explanation may lie in the developing
excess supply of teachers--a situation which could weaken
the constraints imposed by local market forces and increase
the discretion of the local boards in the process of salary
determination. At the same time it is not obvious why
teachers' mobility should have increased between 1960 and
1972; and one should perhaps question whether by 1972 excess
supply has existed for a long enough period to have had a
major influence on the process of salary determination of
public school teachers.

In the light of the preceding it is clear that we cannot
make a definite statement about the factors that brought
about the weakening of the influence of the local market

forces in the process of teachers' salary determination.

Our findings do suggest however the possibility that, in

addition to the previously discussed effects on teachers

salaries and their structure, collective bargaining weakens

the direct role of local market forces on inter-area variations

in these salaries.

Part Two

Teachers' Pensions: An Analysis
of Interstate Variations

I

The question of what determines levels of pension
benefits to be received by different groups of employees
remains a relatively unexplored subject in labor economics.
This is particularly true with respect to public employ-
ment--a sector where pensions have been a well established
employee benefit for decades. The purpose of this
part of the study is to remedy, at least partly, this
deficiency. Specifically, we attempt to identify the
reason for interstate differences in pensions received
by public school teachers and to isolate the influence
exerted on the levels of these pensions--and also on the
contributions made by the employees--by teachers' organiza-
tions.

Pensions are an integral part of teachers' compen-
sation in every one of the fifty states. Except for a
few major cities, teachers' pension programs are admin-
istered and regulated by the states themselves. Within
each state teachers covered by the programs contribute
to the state pension fund in accordance with a uniform
state-wide schedule. Similarly, the pensions received by
the retirees are determined in accordance with formulas
that are applied uniformly within each state. The state-
wide uniformity of the contribution schedules and of the
formulas that determine pensions is in contrast to the
fact that salaries of teachers vary in each state among

individual school districts, depending on the differ-
ences in the supply and demand and other factors char-
acterizing local labor markets. In effect this means
that in determining pension formulas and contribution
schedules the state may be said to take the salary levels
as given; and analogously, from the viewpoint of local
school boards the relationship between salary and pen-
sion is determined by an outside agency.[50] This institu-
tional environment--i.e. the division of responsibilities
between the state and the school districts--differs
considerably from that in which pensions and contribu-
tions are determined for private, federal or state employees.

As already indicated, a crucial issue that we concern
ourselves with is the impact of teacher organizations on
the various state pension systems. Given the state-wide
nature of these systems, the teacher organizations--primarily
state or local bodies of the NEA or the AFT--attempt to
exert their influence through lobbying in state legislatures.
In so far as this lobbying is successful the changes it

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[50]There are a few exceptions to the above. Sources
at the National Education Association indicated to us
that very recently in a few cases local school boards
have been permitted to provide supplementary pension
benefits.

brings about benefit all the teachers in a state--whether
they are represented on a local basis by the organization
or not.   ile this fact may weaken somewhat the impact
of the NEA or the AFT, it is still possible that these
organizations affect, in a measurable way, the systems
of particular states.

Our analysis of the interstate pattern of teachers'
pensions also provides information relevant to the ques-
tion of the impact of Social Security on other pension
programs. Since state retirement systems for teachers
may join Social Security at their own option, and since
many have not exercised this option, an analysis of inter-
state differences of pension plans given as an opportun-
ity to examine with cross-section (rather than time ser-
ies) data the relationship betwee' pension benefits,
employee contributions and Social Security. Such an
examination may, in turn, throw some light on the ques-
tion of the impact of Social Security on the aggregate
level of savings. The reason is that while Social Secur-
ity benefits are financed essentially on a pay-as-you-go
basis, many of the state pension systems are, at least
partially, funded. Thus in so far as Social Security
partially replaces state pension systems, and other saving
behavior is not affected by this replacement, it may have
an effect of reducing aggregate savings.

In addition to the differences in the coverage of Social Security the state pension plans differ also in other respects. First, the division of the public share of pension costs between the state and local districts varies from one state to another. Second, individual states differ in their actuarial procedures and therefore in the way in which they fund their liability for current and future pensions. And third, some states have established separate retirement programs for teachers while in other states teachers and other public employees are part of the same retirement system whether they are members of the organization or not.

The influence of all these factors may be considered most fruitfully in the context of a formal analytical framework. However before proceeding with a more formal analysis we must consider briefly the way in which we measure pensions.

II

The measure of pensions which we use is derived from formulas determined by the legislatures of the various states. These formulas relate individual pensions to salaries and length of service of individual teachers. We apply these formulas to average salaries of teachers covered by each state's pension plan and thus derive an interstate index of pension benefits. Since teachers'

pension benefits contain returns not only to employer
but also to employee contributions, an analysis of pen-
sion systems must take account of interstate differences
in these employee contributions. Accordingly we compute
an index of individual contributions to the pension funds
using the available state schedules and applying them,
in a way analogous to the computation of pensions, to
the data on average salaries.

We believe that, at least in the case of teachers'
pensions, this approach is more useful than the alterna-
tive method used in some studies of supplementary pay-
ments, i.e. a method whereby the value of pension bene-
fits is measured by current employer contributions to the
pension system.[51] First, since in many states liabilities
incurred for pension benefits earned by those employed
in the current period are not fully funded the relation-
ship between current contributions and pension benefits
will depend on the particular funding scheme employed by
the state. Second, some of the liabilities which in the

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[51] For an example of such a study see Robert G. Rice,
"Skill, Earnings, and the Growth of Wage Supplements,"
American Economic Review, Vol. 56, No. 2 pp. 583-593.

past were only partially funded may come due in the

current period, and, therfore, part of the current

employer contributions may be used to pay them off.

Third, part of the current contributions may be used to

pay off liabilities which were actually never funded at

all.[52] Fourth, since actuarial practices differ consider-

ably among individual states even the same degree of funding

may call for different contributions. For all these

reasons current contributions do not provide an index of

actual current costs of pension systems and thus cannot

be used to provide an index of interstate differences in

pension benefits.[53]

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[52]These unfunded liabilities may have arisen for two
reasons. In most states it has been a practice to pro-
vide pension benefits for teachers who were employed
within a state prior to the establishment of the state
retirement system. And, in many states promised pension
benefits for years of service already rendered have been
frequently revised upward without required funding at
the time when these additional liabilities have been
incurred.

[53]Another approach to measuring pensions would base
the estimates of the benefits on the pensions received
by recent retirees. In the case of teachers, however,
pension data for this group are available for only a
limited number of states. Moreover, the complementary
data, such as length of service for these retirees, which
would make possible an analysis of the reason for inter-
state differences in pensions are not readily available.

Although the pension formulas that we use in our
approach vary considerably among the states, they may be
represented in a general form as:

$$P = \alpha + \beta \ (FAS) \ (Yrs) + \gamma \ (Yrs)$$

where

P = Pension

FAS = Final average salary

Yrs = Years of service

and α, β and γ are parameters.

The "final average salary" is calculated differently
among the states. In some states it is calculated as an
average of the salaries received in the last few years
(e.g. three) of service; in other states it is calculated
as an average of the highest salaries received within a
given period before retirement (e.g. the best 3 years
within the last 5 years). Where the formulas called for
FAS to be computed as a 3 year average we approximated
FAS by using, for each state, the average salary in the
school year 1972-73 for all teachers covered by the state
retirement system.[54] Where the formula called for FAS

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[54] In a number of states some of the major cities
have separate pension systems. In such states the aver-
age salaries used to approximate FAS pertained only to
those teachers covered by the state systems. We could
presumably collect data on the actual final salaries
of the teachers retiring in a recent year and use these
in our analysis. However, since the retiring teachers
would be the oldest in the system and thus not representative
in terms of training and salary history, it is doubtful
that their salaries would represent the level of salaries
for which the current state pension formulas were designed.

based on a period other than 3 years, our index was adjusted

appropriately on the assumption that salaries increase

at an annual rate of 3 percent.

"Years of service" pertains to years of employment

as a teacher within a given state. In a number of states,

however, special provisions are available for transferring

credit for out-of-state service.

The parameters α and γ--expressed in dollars--are

most commonly zero. But in some states they may take on

other values.[55] The parameter β commonly varies from .01

to .03. This parameter varies, of course, among the

states. But it also may vary within a state, depending

on years of service and the FAS.

The state pension formulas together with additional

conditions are designed in such a way that the pension

benefits will fall below the final average salary.

Since in the actual formulas the influence of α and γ

is relatively minor, where the value of β in the equa-

tion is low pension benefits will fall below FAS. This

will be true even for those with many years of exper-

ience. In the state formulas where β value are rela-

tively high additional conditions are imposed which

effectively limit the size of the pensions. For example

these conditions may include provisions specifying pen-

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[55]For example the formula in Michigan is 1.25% of the
first $8400 of the FAS plus 1.5% of the remainder of the
FAS, all multiplied by years of service. For salar-
ies above $8400 this reduces to P = .015 (FAS) (Yrs) -
21 (Yrs). For Louisiana the formula is $300 + .02 (FAS)
(Yrs).

sion limits expressed as a percentage of FAS or they may set a maximum number of years for computing pension benefits.

The formula approach can be used fruitfully in 39 of the 48 contiguous states.[56] In the nine states which were not included in the study the value of the pension received is determined, at least in part, by the value of an annuity that is purchased with the contributions made by the employers, the employees or both. Thus to compute pensions in these states we would need a typical age earnings profile for a state--an undertaking that would require information on the salary steps in each one of the school districts within individual states, the changes over time in these salary schedules, the employ- ment mix of the school districts and the changes in this mix over time. Moreover, we would need relevant infor- mation on the investment experiences of the nine state funds. A great deal of the required information is simply not available.

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[56]Given the geographic isolation of the labor markets in Hawaii and Alaska and the obvious special characteris- tics of these states we decided to exclude them from the study. The nine contiguous states for which our approach could not be used are: Idaho, Indiana, Iowa, Maryland, Mississippi, Nebraska, New York, Oregon and Wyoming.

We should note that pension benefits computed on
the basis of the formulas do not reflect interstate
differences in such characteristics of a retirement
system as vesting, disability and survivor benefits,
and early retirement. While this is something of a lim-
itation, it still leaves the formula approach as by far
the most practical method of measuring pension benefits.

III

There may be several reasons why the state becomes
involved in the arrangements pertaining to retirement of
teachers.[57] For example there are likely to be economies
of scale with respect to the management of investments,
the spreading risk of adverse mortality experience, the
costs of administration and other aspects of the retire-
ment system.[58] Also since education is generally viewed
as a state function which has been delegated to localities,

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[57]The following discussion focuses on state policies
pertaining to pension systems of teachers. However, a
great deal of it is also relevant to the pension system
of other local government employees. As already indi-
cated, with the exception of a few large cities, teachers
are covered by state-wide pension systems. This is not
so in the case of the other local government employees
who are frequently covered by purely local systems. (See,
for example, the data on the pension systems of fire
fighters in International Association of Fire Fighters,
Pension Profile, Washington, D.C. 1973.)

[58]Thomas P. Bleakney, Retirement Systems for Public
Employees, Homewood, Illinois, 1972, p. 20.

the state may wish to assure the soundness of teachers

retirement programs. None of these factors provides, how-

ever, a reason why a state would prescribe--through state

imposed formulas--a relationship that would rigidly link

teachers' salaries, length of service and retirement

benefits. The existence of the state-wide formulas that

prescribe the size of pensions seems to imply that the

state's concern goes beyond that about efficiency or

soundness of a retirement system, and that it relates

directly to the conditions under which retired teachers

will live. In fact, it appears reasonable to assume that

the state considers it one of its functions to make sure

that teachers retire under conditions that meet some sort

of a standard that is acceptable in terms of both mater-

ial welfare and of equity.[59] If that is so, the retire-

ment conditions of the teacher influence what may be

termed the utility of the state.

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[59]While some states introduced state-wide pensio··
systems for teachers prior to the enactment of Social
Security, their pension policies were undoubtedly also
influenced by the provisions of the original Social
Security law. These provisions excluded from Social
Security coverage state and local government employees.
In so far as the states have been motivated by the same
factors that led to the enactment of Social Security,
they may be viewed as taking a paternalistic position
with respect to retirement conditions of teachers--i.e.,
a position resulting from the differences in the time
horizon between individuals and the state as a whole.

If the state were concerned only about the retire-
ment status of teachers it could, of course, in an ex-
treme case, simply require all teachers in the state to
purchase pensions until its utility gain from a marginal
purchase would be equal to zero. But we know, in fact,
that the states do not require that the teachers should
bear the full cost of pensions. Accordingly, it is rea-
sonable to infer that in instituting a pension system the
state is constrained by considerations pertaining to the
utility of the currently employed teachers. In other
words, the implication is that individual utility func-
tions of teachers appear as an argument in the utility
function of the state.

These considerations lead us to the formulation of
a model in which the utility of the state is determined
in accordance with the following utility function:

(1) $U_s = U_s(P, SS, W, U_i[(W-C_i'), P, SS], X_o)$

Equation (1) assumes that state's utility (U_s) is
determined by the retirement benefit received by a
representative teacher (i.e. pension (P) and Social
Security (SS)) in relation to his/her wage (W). However
the state's utility is limited by the individual's
own preference (U_i) with respect to current income, i.e.
his wage less the contribution to the state system (C_i),

as against retirement income. The inclusion of SS in the individual's utility function implies the appropriate adjustment of both current earnings and of retirement income for the existence of Social Security. Finally the state also derives utility from the production of other goods and services (X_o).

The relevant budget constraint is given by

(2) $B_s = C_s + Y_o X_o$

For our purpose the state budget (B_s) is assumed to be fixed. C_s is the current actuarial cost of the state contribution to pay for the increment to the pension promised for this years work. Since states have an option to fund their liabilities in many different ways and since different funding scheme may lead to different degrees of pressure on the current state budget, the cost of meeting a new liability resulting from enacting a pension law may be perceived differently by the legislators, depending on the funding scheme that has been adopted. Accordingly, C_s is adjusted by the parameter λ to indicate differences in the cost as it is actually perceived. The second expression in (2) represents the price (Y_o) and quantity (X_o) of other goods produced by the state.

The relation between pensions and contributions is as follows:

(3) $P = q(C_s, \quad)$

In (3) the pension of an individual teacher is determined in accordance with a function g which aggregates individual contributions, imputes a return on an assumption of a given interest rate and other actuarial characteristics, and prorates the pension to a typical individual.

From (3) we solve for c_s which is given by

(4) $\quad c_s = g'(P, C_i)$

where g' is the appropriate inverse function of g.

Substituting (4) into the budget equation (2) we have

(5) $\quad B_s = g'(P, C_i) + Y_o X_o$

Maximizing the state utility function (1) subject to the budget constraint (5) with respect to the three endogenous variables (P, C_i, X_o) we can generate three reduced form equations with these endogenous variables expressed as functions of the parameters of the functions $(U_s, U_i$ and $g')$ and of the variables W, B_s, SS, λ and Y_o. Our interest is only in the reduced form equation for pensions (P) and individual contributions (C_i).

As pointed out previously, the formulas are designed in such way that pensions will not exceed final average salary. We interpret this to mean that legislative preferences are constrained by what may be termed the concept of "maximum acceptable pension." In terms of our

model this means that, where such a constraint is opera-
tive, i.e. for those who have accumulated long periods of
service, pensions may be related to the explanatory var-
iables in a way different from situations where the con-
straint of the maximum acceptable pension does not apply.

The equations which we will estimate below are
linear approximations of the reduced form equations for
pensions and contributions. In view of what was said
above about the constraint of maximum acceptable pensions
we will compute pension benefit estimates for 25 and for
40 years of teacher's service, the assumption being that
in the latter case the process of pension determination
may be influenced by legislative reluctance to have pen-
sions approach final average salary.[60] The independent
variables in the reduced form equations will include both

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[60] The periods of 25 and 40 years seem to be reason-
able representations of periods of moderate and lengthy
years of experience. See for example, National Education
Association, The American Public School Teacher 1965-66,
Washington, D.C. 1967, pp. 12 & 37. Field work interviews
also support this choice.

the exogenous variables mentioned explicitly in the

dis ussion of the model and some additional variables

which will act as proxies for the parameters of the

state and individual utility function.[61]

IV

In the present section we describe the dependent

variables--pensions and contributions and a set of inde-

pendent variables that we use to test the implications of

our model.

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[61]It will be apparent that in accordance with what
was said above the model assumes that salaries are deter-
mined on a local level, i.e. from the viewpoint of the
state they are exogenous. We recognize that salary deter-
mination on a local level may be, in fact, influenced by
the state pension system. In such a case it would be
appropriate to estimate the pension and contribution equa-
tions, implied by the model, using simultaneous equation
techniques where the teachers' salaries are treated as an
endogenous variable. In view of this possibility we will
supplement our ordinary least square regressions with
regression estimates using two-stage least squares. A
more complex problem may arise if the state recognizes
that its pension program may have an effect on salary
determination on the local level and takes this into account
in formulating its pension policy. A model required to
analyze such behavior would have to incorporate, as an
endogenous factor in the state's decision making with
respect to pension, the process of salary determination on
the local level. It seems doubtful, however, that when
state legislatures formulate pension policies they give
serious consideration to the effect of such policies on
the process of local salary determination. And, in any
case, the construction of a model of this type would call
for a complete explanation of the process whereby both
salaries and pensions are determined--a task beyond the
scope of this paper.

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Pensions (P). As we indicated previously we use the formula approach to estimate indices of pension benefits for teachers with 25 and 40 years of experience. The formulas that we use are applicable to teachers who have just joined the retirement system, i.e. the pension benefits are determined on the basis of the most recent provisions of the systems in individual states.

Contributions (C_i). The dependent contribution variable in our model is specified as an annual contribution made by individual teachers. As we already pointed out, we measure these contributions by applying state established schedules to the average salaries of the teachers covered by the retirement systems of each state.[62]

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[62] In a few cases the rate of contribution varied with age at the time of joining the system and with sex of the teachers. In such cases we assumed that the teacher joined the system at the age of 25, and we used the 1972-73 sex mix of the profession in each state.

Social Security (SS). The first independent variable
(SS) pertains to Social Security. This is a dummy vari-
able which takes on a value of 1 where Social Security
coverage is available to teachers employed in a state;
otherwise it takes on a value of 0.[63]

Since our model assumes that a state derives utility
from an adequate retirement income of teachers, the impli-
cation is that the adoption of Social Security would reduce
the role of the state system and have a negative effect
on both pension benefits and individual contributions.
One should bear in mind, however, that many teachers work
for some period of time (both during the summer and after
school) on jobs outside the public school system and thus
may qualify for some Social Security benefits; and that

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[63]Social Security has been introduced in individual
states under varying conditions. In most states where
Social Security was adopted on a state-wide basis at
least all the newly hired teachers were required to join
the system. For those states the formulas that we used
to compute pension benefits and contributions are applica-
ble to the teachers who join Social Security. In eight
of the 39 states in the sample Social Security was made
available on a local option basis. In all of these eight
states an overwhelming majority of teachers in fact, joined
Social Security. In any case, in these states the same
formulas apply to all teachers, whether they joined the
system or not.
     To be sure that the availability of Social Security
on an optional basis had no different effect on pensions
and contributions we estimated a number of regressions
where the optional states were differentiated from those
with Social Security required on a state-wide basis. The
results indicated that the effect of Social Security were
the same in both types of situations.

spouses of married teachers frequently work on jobs covered by Social Security.[64] Accordingly, the effect of the state system joining Social Security on the retirement income of teachers would be less than an analogous effect on a group with no initial coverage by Social Security. Therefore, in so far as the state pensions were already adjusted to the partial coverage by Social Security, one would expect that the state systems that joined Social Security would not reduce state pensions by the full amount of Social Security benefits.

Salary (W). On a priori grounds it is not obvious what the magnitude of the effect of salaries on pensions and contributions (and the implied elasticites) would be. For example, one possibility is that pensions and contributions will not vary significantly with average salary in the state. This would be the case if for the purpose of determining pensions the different state legislatures

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[64]For example, in the summer of 1965 38% of male teachers and 9% of female teachers held jobs outside of the public school system. During the school year 1965-66 22% of male and 4.6% of female teachers held such jobs. In addition, 65% of female teachers were married with 83% of their husbands employed on a full time basis. About 76% of these husbands worked on jobs outside of teaching. The American Public School Teacher, 1965-66, op. cit. pp. 33, 39, 40.

had the same view of what is a reasonable level of pen-
sions--in dollar terms--for an average teacher in their
states. Such behavior in the part of the legislatures,
however, would be difficult to reconcile with the fact
that within individual states the respective pension
formulas generally call for higher pensions for those
who earn relatively high salaries.

Another possibility is that taking into account
individual preferences state legislatures determine pen-
sions in a way that is generally consistent with the
implications of the standard theory of consumer behavior.
If the individual preferences are assumed to be relatively
homogeneous, the elasticities of pensions and contribu-
tions with respect to salaries should be, ceteris paribus,
close to unity. On the other hand, if time preferences
are assumed to vary systematically with salary levels,
their elasticities may be significantly different from
one. This is the case in unionized construction where
the results imply that the elasticity of pensions with
respect to wages is, in fact, significantly greater than
unity.[65]

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[65]A. L. Gustman and M. Segal, "Wages, Wage Supple-
ments and the Interaction of Union Bargains in the Con-
struction Industry," Industrial and Labor Relations Review
January 1972 p. 182.

State Budget (B_s). The model suggests that one of
the independent variables in the two reduced form equa-
tions should be an index of the budget constraint facing
state legislatures. In the following analysis this in-
dex is measured by state current expenditures per capita.
The presumption is that interstate variations in these
expenditures provide, ceteris paribus, an indicator of
interstate differences in willingness and ability to
finance public goods.

State-Local Contributions to Pensions Funds (SF or SLF).
The model presented above assumes that the entire employer,
i.e. public contribution to the pension fund, is paid by
the state. The state laws do, in fact, prescribe the size
of such contributions. But in some states the pay-
ments are made only by the state, in others only by the
school districts, and in still others these payments are
shared by the state and the school districts. And even
these distinctions are somewhat blurred since in some
cases what is a local contribution may be financed by
means of a special state tax, and what is a state contri-
bution may be deducted from the allocation of state aid
to individual localities.

These different methods of financing employer con-
tributions have some implication for the process of
pension determination as visualized by our model. Since
payments by school districts are an additional source of

funds for financing employer contributions they relax

the budget constraint facing the state. However, the

fact that it is in the state's interest to limit the

local tax burden tends to counteract this effect.[66] To

take account of these considerations we include among

the independent variables of our estimating equation two

dummy variables. The first of these--SF--takes on a

value of 1 if the employer contribution is financed only

by the state; otherwise it takes on the value of 0. The

second dummy variable--SLF--takes on a value of 1 if the

state and the local districts share the employer contri-

bution; otherwise it takes on the value of 0. Clearly, if

both dummy variables take on a value of 0, the full bur-

den of employer contribution is borne by the local author-

ities.

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[66]In terms of our model the factors mentioned above
have the following implications:
    1. For those states where a portion of or the entire
employer contribution is financed by a local district the
equation which relates pensions to contributions (Equation
(3)) must be modified to reflect this fact. Equation 5--
i.e. the final equation for the budget constraint--must
also be modified accordingly.
    2. The parameter λ in equations (2) and (5)--i.e. the
perceived price of state liabilities--may be different in
those states where the employer contribution is financed
at least in part by local districts from that in the states
where the cost of the entire contribution is borne by the
state.
    3. In view of the state's concern about the local tax
burden the utility that it derives from teachers' pensions
may be affected when employer contributions are financed
at the local level. If this is so, Equation (1)--i.e. the
equation for the utility function of the state--must be
modified accordingly.

Teachers Retirement System (TRS). Our model pre-
supposes that the teachers have a separate retirement
system. In some states, however, teachers are covered
by a state-wide retirement program that covers also other
public employee groups. In such states both pension
benefits and employee contributions of the various groups
of public employees are likely to be strongly interdepen-
dent. The interdependence may affect the state budget
relevant to the process of determination of teachers'
pensions. And it may also influence the legislatures'
view of what is a reasonable formula for linking teachers'
pensions, contributions and salaries (i.e. the form of
the state's utility function).

It is not obvious on a priori groups whether teachers
will be better off in a separate retirement system or in
one that includes other public employees. If the teachers
wield more influence in legislatures than other employees,
they might gain better pensions under conditions where
there is less interdependence among the benefits and con-
tributions of the various groups of employees. But if
they are less influential than other public employees,
they may actually benefit from being included in a state-
wide retirement program.

To take into account the fact that where teachers
have a separate retirement system their pensions and con-
tributions may be different from those in the states where

teachers and other public employees are covered by the same system, we include as one of our independent variables an appropriately defined dummy variable. This variable takes on a value of 1 for those states that have a separate retirement system; otherwise it takes on a value of 0.

Median Age of Teachers (AGE) and Proportion of Teachers who are Female (FEM). Both the states' and individuals' assessment of the relative importance of pensions--and therefore the corresponding utility functions--may depend on the demographic characteristics of the potential retirees. Of these the most important appear to be the teachers' age and their sex composition. These two characteristics may also influence the way in which state legislatures perceive the cost of pensions.

On a priori grounds it seems reasonable to assume that the older the average teacher the greater will be the importance attached by both legislatures and individuals to the provision of adequate pensions. However if the retirement systems are not fully funded an older teachers work force implies a shorter period to the time when unfunded liabilities become due. Under such conditions the perceived cost of pensions (i.e. the value of ·) in equation (5)) may be higher for an older teachers work force than for a younger one. To measure the influence of teacher's age on pensions and contributions we include as one of our independent variables the median age of teachers in each state.

The effect of sex composition (measured in our esti-
mating equation by the proportion of females among the
teachers) is also not obvious on a priori grounds.   In
the first place this effect may depend on the stereotype
image the legislatures have of a retired female teacher.
If the legislatures view such a retiree as a single person
paternalistic considerations may lead them to provide a
relatively high level of pension benefits and also possi-
bly require relatively high contributions.   But, if female
teachers are viewed as essentially secondary workers,
this view may lead to relatively less concern about the
level of pensions and a correspondingly low level of con-
tributions.   In the second place, sex composition may have
an effect on the relative cost of pensions.   Since life
expectancy of women exceeds that of men, the higher the
proportion of women the larger the cost to the state of
providing a given level of benefits, and this may lead to
lower pensions.   Proportion of women in the work force may
also affect costs because of differences in turnover
between men and women, and the fact that non-vested state
contributions made on behalf of teachers who leave the
system may be used to finance benefits for those who remain.[67]

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[67]In general, females are less firmly attached to the
labor force and for this reason one would expect greater
turnover among female than among male teachers. However
this may be offset by the fact that male teachers are
likely to have more occupational opportunities outside of
teaching than females and this may increase their turnover.

<u>Strength of Collective Bargaining</u> (NEG) <u>and Legal</u>

<u>Framework</u> (LAW). The legislative policy toward pensions
is likely to be affected by the overall political environ-
ment in the state. As indicated previously, through
their lobbying at a state level teachers' organizations
constitute a factor shaping this environment. It is rea-
sonable to assume that the effectiveness of these organ-
izations--i.e. essentially their influence on the state's
utility function--depend on their strength in individual
states. To measure strength of teachers' organizations
we use as an independent variable NEG the proportion of
teachers covered by state pension plans who are also
covered by negotiated agreements with local school boards.

As another indicator of political environment related
to legislative preferences we include as an independent
variable an index that is designed to measure state legal
requirements for recognition of and bargaining with
teachers' organizations. Such an index was constructed
by T. A. Kochan in the context of constructing a more
general index of state laws pertaining to collective
bargaining in the public sector.[68] The Kochan index is an
ordinal one, with increases in its value implying a more

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[68]Thomas A. Kochan, "Environmental Correlates of
Public Sector Bargaining Laws," <u>Industrial Relations</u>,
October 1973, pp. 322-35.

formal and more comprehensive legal framework within
which collective bargaining with teachers operates within
each state. In practice, increases in this index imply
a relatively more supportive environment for achieving
the goals of teachers' organizations.

The Price of Pensions (λ) and The Price of Other
Goods and Services (Y_o). As can be seen from the preced-
ing discussion, a number of the independent variables--SF,
SLF, TRS and also AGE and FEM--bear some relation to the
price of pensions as perceived by state legislatures (λ).
However, the most important systematic factor affecting
λ, i.e. the funding scheme adopted in the course of enact-
ing a pension law, cannot be readily quantified. As a
result we have no way of introducing a direct measure of
the perceived cost of pensions.

Another variable suggested by the model--the price
of other goods and services bought by the state (Y_o)--
could not be included because an appropriate price index
by state is not available. The omission of a direct
measure of λ and of Y_o undoubtedly produces some bias in
the coefficients to be estimated for the included vari-
ables. The direction of that bias is not obvious on
a priori grounds.

Adjustment for Post-retirement Increase (ADJ). The measure of pensions which we use in the first of our estimating equations does not fully reflect, for all of the states, the value of pension benefit that may be reasonably expected. The reason is that some of the states make periodic adjustments in the pension benefits of those already retired. Some of these adjustments are automatic, frequently related to changes in the cost of living; other adjustments may be made on an ad hoc basis. In order to take these adjustments into account, we include in the estimating equation for pensions a dummy variable (ADJ) which takes on a value of 1 if the data for a given state indicate either provisions for automatic adjustment or recent pension increases for those already retired; otherwise the variable takes on the value of 0.

Since the rate of contribution may be designed to reflect the existence of a post-retirement adjustment, ADJ is also included as an independent variable in the estimating equation for contributions.

V

The estimating equations discussed in the preceding pages are:

$$(6) \quad P = a_1 + b_1 SS + c_1 W + d_1 B_s + e_1 SF + f_1 SLF$$
$$+ g_1 TRS + h_1 AGE + i_1 FEM + j_1 NEG + k_1 LAW + l_1 ADJ$$

$$(7) \quad C_i = a_2 + b_2 SS + c_2 W + d_2 B_s + e_2 SF + f_2 SLF$$
$$+ g_2 TRS + h_2 AGE + i_2 FEM + j_2 NEG + k_2 LAW + l_2 ADJ$$

where the dependent variables are:

P = pension computed on the assumption of
25 or 40 years o service.

C_i = annual contribut.on made by a teacher
covered by the state retirement system.

The independent variables are:

SS = dummy variable with a value of 1 in
states where Social Security is available
to teachers; otherwise the value is 0.

W = average salary for the teachers covered
by the pension system.

B_s = state budget constraint.

SF = dummy variable with a value of 1 in
states where the employer contribution
is paid only by the state; 0 otherwise.

SLF = dummy variable with a value of 1 in states
where the employer contribution is shared
by the state and by local districts; 0
otherwise.

TRS = dummy variable with value of 1 in states
where teachers have a separate retire-
ment system; 0 otherwise.

AGE = median age of teachers.

FEM = proportion of teachers who are female.

NEG = proportion of instructional staff in the

pension system covered by neogitated

agreements.

LAW = index of state requirements for recog-

nition of and bargaining with teachers'

organizations.

ADJ′ = dummy variable with a value of 1 in states

where there are provisions for automatic

adjustment of pensions or where there have

been recent adjustments; 0 otherwise.[69]

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[69]The sources for the data are as follows: SS, SF,
SLF, TRS and ADJ from National Education Association,
Teacher Retirement Systems, 1974; W from National Educa-
tion Association, Twenty Sixth Biennial Salary and Staff
Survey of Public-School Professional Personnel 1972-73,
NEA Research Report 1973-R5; P, C_i from the two sources
above; B_S from Bureau of the Census, Governmental Finances
in 1972-73; AGE from U.S. Department of Commerce, Census
of Population 1970, Detailed Characteristics, #2-52,
Tables 173 and 174 and from National Education Association,
Twenty Fifth Biennial Salary Survey of Public-School
Professional Personnel, 1970-71, Volume I. FEM from
National Education Association, Estimates of School
Statistics 1970-71 Research Report 1970-R15, Table 5 and
Census of Population, 1970 Detailed Characteristics, #2-52,
Table 173 and from National Education Association Twenty
Fifth Biennial Salary Survey of Public-School Professional
Personnel, 1970-71, Volume 1. NEG from National Education
Association, Negotiation Research Digest, June 1973,
volume 3, #10, Table D-1; and National Education Associa-
tion, Estimates of School Statistics, 1973-74, Table 5;
LAW from Thomas A. Kochan, "Environmental Correlates of
Public Sector Bargaining Laws," Industrial Relations,
October 1973.
    In those cases where particular information was not
available in the cited source we obtained supplementary
information from other published sources, from the
Washington office of the National Education Association
and from the offices in charge of the pension systems of
individual states. Further details of our methodology
are in Appendix B.

The results of our empirical analysis are presented
in Table 15.[70] These results are consistent with the
basic assumptions of our model, i.e. that while the
state derives utility from providing pensions for teachers,
in setting up a pension system it also takes into account
the utility preference of individual teachers. As can be
seen, the signs on the variables are generally consistent
with our expectations; all the variables but two (B_s and
SF) have coefficients that suggest statistically signifi-
cant relation in either a pension equation, the contribu-
tion equation or in both; and, for a cross-section study
of this kind, the $\bar{R}^2$'s are reasonably satisfactory.

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[70]We also computed versions of the equations presented
in Table 15 using, instead of average salary for teachers
covered by state pension plans, the salary in the 75th
percentile of all teachers employed in each state. Because
of lack of data we are unable to compute the 75th per-
centile salary for only those teachers covered by state
systems, i.e. a salary measure that excludes teachers'
salaries in several major cities that have their own
retirement systems. Nevertheless, given the possibility
that retiring teachers may be getting salaries that
exceed average salaries of those covered by state systems,
we felt that such a computation will be of interest. In
fact, it turns out that the results of the regression using
this alternative salary variable parallel closely the
results reported in Table 1.

The first variable to be considered is SS--the
Social Security variable. This variable has a significant
and, as expected, a negative effect on both pensions
and contributions. Specifically, availability of Social
Security to teachers lowers pensions computed on the
basis of 25 years of experience (P- 25) and those computed
on the basis of 40 years (P- 40) by $1385 and by $1926
respectively. The size of these reductions is well
below the amount of Social Security benefits which would
be currently received by a typical retired couple in
the income bracket of an average teacher. As stated
previously, in so far as the state pensions in the states
where Social Security is not officially available to
teachers have been adjusted to take into account partial
Social Security coverage of many teachers, this is the
expected result. The analogous reduction in individual
contribution is $220. Since the average values of P- 25
and P- 40 are $3975 and $6109 respectively and the
average contribution is $515, the effect of SS is to
reduce contributions proportionately more than pensions.[71]

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[71] These results show that making Social Security
available has an effect of raising, from the viewpoint
of the individual teacher, the benefit-cost ratio of
state pension systems. This does not mean, however, that
official availability of Social Security necessarily
improves the teachers' status in terms of total costs
and benefits of post-retirement income. To answer the
question of whether the teachers' status is improved one
would need measures of the value of the benefit-cost ratio
(cont.)

Table 15

Empirical Results*

	Dependent Variables		
	P-25 (25 years of service)	P-40 (40 years of service)	C_i
SS	-1385 (-6.73)	-1926 (-6.99)	-219.7 (-5.99)
W	.4173 (3.18)	.6862 (3.90)	.0651 (2.78)
B_s	.3543 (.26)	-1.912 (-1.05)	.1447 (.60)
SF	151 (.74)	164.7 (0.6)	-25.37 (-.70)
SLF	383 (1.37)	820.7 (2.19)	81.99 (1.64)
TRS	276 (1.57)	510.1 (2.16)	76.25 *(2.43)
AGE	129 (2.07)	123.2 (1.48)	16.26 (1.47)
FEM	71.26 (2.91)	74.96 (2.29)	-4.833 (-1.10)
NEG	17.22 (2.18)	11.51 (1.09)	-.5196 (-.37)
LAW	4.00 (.26)	4.746 (0.23)	-6.607 (-2.41)
ADJ	-386 (-1.65)	-784.0 (-2.50)	73.91 (1.77)
Intercept	-9528 (-2.84)	-8614 (-1.92)	-280.6 (-.47)
$\bar{R}^2$ (Standard error)	.7993 (493.2)	.8074 (659.9)	.7195 (87.81)

*t-statistics in parentheses.

The findings with respect to the relations between

pensions, contributions and the second independent

variable--salaries (W)--are statistically significant

and generally consistent with the implications of the

standard theory of consumer behavior--i.e. that differences

in salaries are reflected in roughly proportional differences

in retirement benefits and contributions.[72] The elasticities

of P-25, P-40 and C_i with respect to salaries are .99,

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of the state systems and of Social Security. Indeed in
the case of Social Security one would need the benefit-
cost ratio of an extension of coverage to teachers who, for
reasons indicated previously, already have partial cover-
age. Our model, designed to explain interstate variation
in pensions and individual contributions, does not call
for data which would be necessary to compute the <u>levels</u>
of such benefit cost ratios. Accordingly the results of
our regressions cannot throw light on the question of
whether the introduction of Social Security improves teacher
status in terms of costs and benefits of their post-
retirement income. It is relevant to note here that any
comparison of costs and benefits of the state system
and of Social Security would have to go beyond more com-
putations of total employee contribution and total pen-
sions. For example, in view of the turnover in the
teaching profession, coverage by Social Security may
provide a firmer guarantee of retirement income than
is available under a state system.

[72]As we noted above (fn. 61) there is some possibil-
ity that salaries established at a local level will be
influenced by the nature of the state pension system.
To take account of this possibility we estimated versions
of the pension and contribution equations using two stage
least squares where the salary variable is treated as
endogenous. In addition to the exogenous variables
described in the text a set of exogenous variables for
the salary equation was adopted from M. O. Clement and
A. L. Gustman, Factor Cost Differences, <u>Educational</u>
<u>Equality, and Funding Decisions in Public Education</u>,

1.05 and 1.19 respectively. An elasticity greater than

unity is consistent with the kind of tax advantages inherent

in our tax system that are described by Rice.[73]

As indicated in the previous discussion, we had

no firm expectations with respect to the impact of

the SF and SLF variables on the size of pensions and

contributions. The results suggest that there is

something of a tendency toward higher pensions in those

states where the employer contribution is shared by

the state and by the local governments but only in the

P-40 equation is the SLF coefficient significant at a

conventional level. The coefficient on SLF in the

contribution equation is positive but not significant.

Report to National Institute of Education, Project No.
2-0681, March 1975. Coefficients estimated for all but
the endogenous salary variable were identical for 2SLS
and OLS versions of each equation. As the theory would
lead one to expect, the 2SLS estimate of the coefficient
on the salary variable exceeded the OLS estimate for
each of the pension equations. Also in accordance with
the theory, the 2SLS estimate of the salary coefficient in
the contribution equation was smaller than in the OLS
equation. (See J. Bronfenbrenner, "Sources and Size of
Least-Squares Bias in a Two-Equation Model," Studies in
Econometric Method, eds. W. C. Hood and T. C. Koopmans,
New York, 1963).

[73] Rice op. cit.

The results pertaining to TRS indicate that there
is a tendency for teachers pensions and for contribu-
tions to be higher in the states where their pension
systems are set up on a separate basis, i.e. where they
are not linked formally with those of other employees.
However, while under such institutional arrangements
pensions are higher (in terms of average pension for
the sample) by about 7-8 percent, the yearly contribu-
tions are higher by a larger percentage, i.e. by about
15 percent. It appears thus that the teachers may be
getting a better deal, at least in relative terms, where
their pension system is combined with that of other public
employees in the state.

The coefficients on AGE and FEM suggest that prefer-
ences of state legislatures are systematically affected
by age and sex composition of the teachers work force.
Among the 39 states pensions vary positively with the
average age of teachers and with the proportion of women
in the work force. The elasticities in P-25 with
respect to age and proportion of women are 1.20 and
1.22 respectively; in P-40 the respective elasticities
are .75 and .83 but the coefficient on the AGE variable
is not significant. The fact that the elasticities in
the P-25 equation exceed those in the P-40 equation
and, indeed, the fact that AGE is not significant in

P-40 may reflect the influence of the previously dis-
cussed concept of "maximum acceptable pension." In
other words, the view that pensions should be less than
final average salary may tend to mitigate the effects
of teachers' age and sex composition on legislative
preference. As can be seen in Table 1, in the contri-
bution equation neither the AGE nor the FEM coefficient
is statistically significant.

The NEG variable is significant in the P-25 equation
and indicates that the effect of teachers' organizations
on pensions may be quite important. The potential
importance of this effect can be measured by predicting
from the regression equation, assuming average values
of the other independent variables, the pensions that
would be received under conditions of a 100% and a 0%
coverage by negotiated agreements within a state. The
pensions that would be received under a 100% coverage
would be 54% greater than those received under 0% coverage.
Among the 39 states in the sample coverage by negotiated
agreements ranges from zero to 88% of the teachers.
Thus the maximum difference in pensions attributable to
the effect of teachers' organizations is about 48%.

In contrast to the above, the coefficient on NEG
in the P-40 equation is not significant. This is con-
sistent with our previous discussion about the limitations

on the size of pensions resulting from the concept of a
maximum acceptable pension. Specifically, while
teachers' organizations may be a major factor in raising
pensions where the pensions constitute 40-50% of final
average salary, they may encounter considerable resist-
ance when pensions--which after all in 70% of cases are
augmented by Social Security--account for two thirds or
more of such a salary.

There are also other factors that may explain the
differences in the effectiveness of teachers' organiza-
tions on the pensions of teachers with 25 and 40 years of
service. To the extent that such organizations are
guided by egalitarian considerations they are likely to
be more concerned about those teachers whose pensions will
constitute a relatively small proportion of their salary.
In addition, teachers' organizations have shown strong
and growing interest in early retirement. An obvious way
of making early retirement more attractive is to
raise relatively the pensions received by those with
less than maximum years of service.

Judging from our results, teachers' organizations have
not had a significant effect on individual contributions
to the pension funds. While the coefficient on NEG
in the contribution equation is negative, it is very
small and not significant. This situation, however,

appears to be changing. Some of our field work interviews
indicate that, apparently as a result of the efforts of
teachers' organizations, a few states have recently
placed their pension system on a noncontributory basis.

It may be helpful to use some very rough estimates of
the cost of pensions to put our findings with respect
to the impact of teachers' organization on pensions of
teachers with 25 years of experience in a broad perspec-
tive. As pointed out before, the current employer con-
tributions do not provide a measure of the actual costs
of the currently promised pension benefits. For the
purpose of illustration, however, let us assume that
in the unorganized states the current cost (including
employee contribution of the promised pension benefit
constitutes 10 percent of the annual salary. Given this
assumption, our results suggest that in the extreme--
i.e. if teachers are fully covered by negotiated agree-
ments--current pension costs might be raised to 15 percent
of the annual salary. In other words, in the extreme,
the effect of teachers' organizations may be to
increase benefits by an amount equal to 5 percent
of the salary. Such an increase corresponds roughly
to what has been estimated as the effect of teachers'

unions on teachers' salaries.[74] The implication is
that in terms of total annual employment cost the
effect of teachers' organizations on pensions may be,
roughly, as important as the analogous effect on salaries.

As indicated previously the LAW variable, in
effect, reflects the degree to which the legal environ-
ment of individual states is supportive of collective
bargaining by public school teachers. Our results indi-
cate that in those states where the LAW variable has
high values teachers' contributions to the funds are
significantly lower than in the states with a less favor-
able legal environment. This variable, however, is not
significant in the pension equations.

The results pertaining to ADJ indicate that in those
states where pensions are supplemented by post-retirement
adjustments, the pensions determined by state formulas
are lower and the individual contribution higher. These
results seem to be quite reasonable.

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[74]See, for example, H. Kasper, "Reply," Industrial
and Labor Relations Review, April 1972, p. 423. We should
not be particularly surprised by the fact that teachers'
organizations have a proportionately greater impact on
pensions than on salaries. An important reason is that
teachers' organizations have lobbied on the state level for
years; in contrast, they have been bargaining collectively
for salaries for a relatively short time.

Finally, we should note that one variable directly
suggested by our model--B_s--is not significantly related
to either pensions or contributions. One reason for this
may be that the B_s variable--pertaining as it does to
state budgets--does not reflect fully the relevar budget
constraint since in almc   half of the states localities
are responsible--at least formally--for some of the
employer contributions to pension funds.[75] In addition
in the six of the 39 states where employer costs are
shared by state and local governments the relative
shares of the two governments vary among the states at
any point of time, and the division of responsibility
changes over time. Given the previously mentioned
problems of computing the cost of pension systems, it is
not possible to obtain reliable estimates of the shares
of the cost borne by the states and localities. There
may be also other reasons, including the possibilities
of measurement error, of the effects of the omitted
variables, or of the fact that our simplifying assumption
that the state budget is fixed is inappropriate. While

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[75]As pointed out in footnote 66, the fact that in
many states localities pay for at least part of the
cost of pensions would have to be reflected in several
modifications of the original model.

one could deal with this last possibility by building

a tax function into our model,[76] we believe that such

a procedure would complicate the analysis with little

likelihood that it would add importantly to our findings.

IV

A number of points emerge from the discussion and

analysis of this paper:

1. A useful measure of interstate variations in

pensions of public school teachers can be derived from

the available state formulas for pension benefits. In

view of the considerable differences among the states in

funding and actuarial practices it would not be appro-

pr   e to derive such a measure from the data on employer

contrib   ons.

2. A relatively simple model which assumes that state

legislatures derive utility from providing adequate pension

benefits for retired public school teachers appears to

provide a reasonably satisfactory explanation of interstate

variations in the measure of pensions and individual contributions.

3. The results of regressions suggested by this

model indicate that, ceteris paribus, at a given moment

of time pensions vary among the states in a way roughly

proportionate to teachers' salaries.

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[76]For an example of an analysis that incorporates a
tax function see W. W. McMahon, "An Economic Analysis of
the Major Determinants of Expenditures in Public Educa-
tion," Review of Economics and Statistics, August 1970.

4. The empirical findings also indicate that, ceteris paribus, official adoption of Social Security reduces pension benefits and contributions under the state system. In so far as the partial replacing of state pensions by Social Security does not affect other kinds of savings, the official adoption of Social Security is likely to reduce overall savings. The reason is that, on the average, the state systems are much more fully funded than Social Security.

5. Finally, our results provide an indication of the importance of teacher organizations in influencing the size of state pensions. Specifically, they indicate that the efforts of these organizations increase considerably the pensions of those teachers who retire after 25 years of service. In contrast, it appears that these organizations have little impact on the pensions of teachers who have accumulated long periods of service, i.e. those whose pensions, computed on the basis of state formulas, would approach the levels of their final salaries.

Appendix A

We are listing below the central city school districts
which constitute our sample for the 1972 and 1960 regres-
sions pertaining to the various measures of teachers' salaries.
In both years we used all the central city districts drawn
from the largest eighty five SMSA's for which the relevant
data were available. For 1972 we could use 93 such districts;
for 1960 only 84. We excluded Washington, D.C. because
of its special and unique characteristics with respect to
school financing and other relevant aspects. The list for
1972 is as follows:

Mobile Co., Alabama

Pheonix, Arizona

Anaheim, California

Garden Grov California

Santa Ana, California

Fresno, California

Los Angeles, California

Long Beach, California

Sacramento, California

San Bernardino, California

Ontario, California

San Diego, California

Oakland, California

San Francisco, California

San Jose, California

Denver, Colorado

Bridgeport, Connecticut

Hartford, Connecticut

New Haven, Connecticut

Wilmington, Delaware

Broward Co., Florida

Duval Co., Florida

Dade Co., Florida

Orange Co., Florida

Hillsborough Co., Florida

Pinellas Co., Florida

Atlanta, Georgia

Chicago, Illinois

Gary, Indiana

. ianapolis, Indiana

Kansas City, Kansas

Wichita, Kansas

Louisville, Kentucky

New Orleans, Louisiana

Baltimore, Maryland

Boston, Massachusetts

Springfield, Massachusetts

Worcester, Massachusetts

Detroit, Michigan

Grand Rapids, Michigan

Minneapolis, Minnesota

St. Paul, Minnesota

Kansas City, Missouri

Omaha, Nebraska

Jersey City, New Jersey

Paterson, New Jersey

Albany, New York

Schenectady, New York

Buffalo, New York

New York City, New York

Rochester, New York

Syracuse, New York

Rome, New York

Mecklenburg Co., North Carolina

Greensboro, North Carolina

Forsyth Co., North Carolina

High Point, North Carolina

Akron, Ohio

Canton, Ohio

Cincinnati, Ohio

Cleveland, Ohio

Columbus, Ohio

Dayton, Ohio

Youngstown, Ohio

Warren, Ohio

Toledo, Ohio

Oklahoma City, Ohlahoma

Tulsa, Oklahoma

Portland, Oregon

Allentown, Pennsylvania

Harrisburg, Pennsylvania

Philadelphia, Pennsylvania

Pittsburgh, Pennsylvania

Providence, Rhode Island

Knoxville, Tennessee

Memphis, Tennessee

Nashville, Tennessee

Beaumont, Texas

Port Arthur, Texas

Dallas, Texas

El Paso, Texas

Fort Worth, Texas

Houston, Texas

San Antonio, Texas

Salt Lake City, Utah

Norfolk, Virginia

Portsmouth, Virginia

Richmond, Virginia

Seattle, Washington

Everett, Washington

Tacoma, Washington

Milwaukee, Wisconsin

In our 1960 regression we had to exclude the following from the above list: Anaheim, California; Garden Grove, California; Santa Ana, California; Kansas City, Kansas; Greensboro, North Carolina; Forsyth Cc., North Carolina; High Point, North Carolina; Fort Worth, Texas; Everett, Washington.

Appendix B

This appendix provides supplementary material pertaining
to the analysis of the determinants of pensions of public
school teachers. Specifically, it describes in some detail
the way in which we derived each of the variables in our
estimating equations.

P-25. This variable constitutes an index of the pensions
paid to individual teachers employed in different states.
It is computed for an individual who becomes employed as
a teacher in a relevant state in 1973 and retires twenty-
five years later.

As pointed out in the text, teachers' pensions are based
on formulas which use the concept of Final Average Salary (FAS).
As an index of FAS--where it is computed as an average salary
in the last 3 years before retirement--we use the average
1973 salary of all the teachers covered by the state pension
system in a given state (the computation of such average
salaries is discussed below). We assume that a teacher's
salary increases at a rate of 3% per annum and we use this
assumption to derive FAS in those states where it is computed
over a period other than 3 years. Specifically, in order
to obtain an FAS from the average 1973 salary of all the
teachers covered by a state system we multiply the latter

measure by the following factors:

    FAS computed over 2 years = 1.0147

    FAS computed over 3 years = 1.0000

    FAS computed over 4 years = 0.9856

    FAS computed over 5 years = 0.9714

The state formulas for computing pensions are in National

Education Association, Teacher Retirement Systems, 1974.

P-40. This variable constitutes an index of the pensions

paid to individual teachers employed in different states.

It is computed for an individual who becomes employed as

a teacher in 1973 and retires forty years later. The computations

of P-40 are analogous to those of P-25.

C_i. This variable constitutes an index of employee contributions

made by teachers covered by state pension systems. The

formulas for computing employee contributions are in

National Education Association, Teacher Retirement System,

1974. To compute C_i we apply these formulas to the average

1973 salaries of all the teachers covered by the state pension

system of individual states.

    In three states--New Hampshire, New Jersey and Vermont--

employee contributions depend on the age at which the

individual joins the system and on the individual's sex.

We assumed that all individuals join the pension system at

the age of 25, and we used the actual sex ratios of the teachers

employed in these states in the 1972-73 school year as weights

to compute C_i. (The data on male-female employment are

in National Education Association, Estimates of School

Statistics, 1973-74, Research Report R-8, Washington, D.C.

1974).

SS; SF; SLF; TRS; ADJ. The source of these dummy variables

is National Education Association, Teacher Retirement

Systems, 1974.

W. This variable represents the average 1972-73 salary of

those teachers in each state who are covered by the state

pension system. In several of the 39 states covered in the

study major cities have their own pension systems for teachers.

These cities are as follows:

    Colorado--Denver

    Delaware--Wilmington

    Georgia--Atlanta

    Illinois--Chicago

    Kansas--Kansas City

    Massachusetts--Boston

    Michigan--Detroit

    Minnesota--Duluth

        Minneapolis

        St. Paul

    Missouri--Kansas City

        St. Louis

Tennessee--Knoxville

Memphis

Wisconsin--Milwaukee

The source of the state salary data and for the number
of teachers by state is National Education Association, <u>Estimates</u>
<u>of School Statistics, 1973-74</u>, Research Report 1973-R8. In
excluding the cities with their own pension systems we used
the following formula:

$$W = \frac{(W_s)(T_s) - (W_c)(T_c)}{(T_s - T_c)}$$

Where W_s = Average salary in the state

T_s = Number of teachers in the state

W_c = Average salary in the city with its own
pension plan

T_c = Number of teachers in the city with its
own pension plan

The data for $\underline{W_c}$ and $\underline{T_c}$ are from National Education
Association, <u>26th Biennial Salary and Staff Survey of Public</u>
<u>School Professional Personnel, 1972-73</u>, Research Report 1973-R5,
except for the data for Chicago, Duluth, St. Paul, Wilmington,
Atlanta, Kansas City, Kansas and Knoxville. For the first
six of these cities the salary was estimated by multiplying
the 1972-73 value for W_s by the ratio of $\frac{W_c}{W_s}$ for 1970-71. The
data for $\underline{W_c}$ for 1970-71 are from National Education Association,
<u>25 Biennial Salary Survey of Public School Professional Personnel</u>
(1970-71), vol. 1, Report 1971-R5. W_s for 1970-71 is from

National Education Association, <u>Estimates of School Statistics,</u>
<u>1970-71,</u> Report 1970-R15. For Knoxville we had to use the
1968-69 data and adjust them as described above. The estimates
of T_c for 1972-73 are from unpublished data collected by the
National Educationa Association except for Chicago where it
came from the U.S. Office of Education.

B_s. This variable is represented by direct general expenditures
(other than capital outlays) of each state government for all
purposes <u>per capita</u>, 1972-73. All intra-governmental
transfers are excluded. The source is Bureau of the Census,
<u>Governmental Finances 1972-73</u>, Washington, D.C. 1974.

AGE. This variable represents the median age of teachers
covered by the state systems. The data for median age are
from <u>Census of Population 1970, Detailed Characteristics</u>
No. 2-52. The numbers of teachers are as described under W.

FEM. This variable measures the proportion of teachers
who are female. The source is as above under AGE.

NEG. This variable measures the proportion of the professional
instructional staff covered by the state pension system that
is represented by a teachers' organization for the purpose
of conducting negotiations in the school year 1972-73. The
source for the number represented is National Education Association,
<u>Negotiation Research Digest</u>, June 1973, vol. III. For the
total number of instructional staff in the state the source

is National Education Association, <u>Estimates of School</u>

<u>Statistics, 1973-74</u>. The data were adjusted to exclude

the cities with independent pension systems. Estimates

for the number of instructional staff in these cities

were calculated by multiplying the number of teachers in each

city in 1972-73 by the ratio of the total number of instructional

staff in the state to the total number of teachers in the state

for that year. Data for the number of teachers are from the

sources indicated in the discussion of the salary variable $\underline{W}$.

<u>LAW</u>. The source of this variable is Thomas A. Kochan,

"Environmental Correlates of Public Sector Bargaining Laws"

<u>Industrial Relations</u>, October 1973.