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ABSTRACT

This report critiques Herschel Kasper's study on the impact of collective bargaining on public school teachers, a report that found little relation between unionization and average State salary levels. This paper makes three major objections to Kasper's study: (1) its use of State data as the basis for observations in the cross-sectional analysis despite the concentration of unionization and salary determination at the local district level; (2) its use of average salaries in the State as the dependent variable; and (3) its omission of the structure of the school districts in the State, an important offset or aid to unionization goals. The authors argue that disaggregation from the State level to the district level is the only way to avoid bias caused by weighing different types and sizes of districts equally. (Author/JF)

THE EFFECTS OF COLLECTIVE BARGAINING ON PUBLIC SCHOOL TEACHERS' SALARIES: A COMMENT

by

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I. Introduction

Hirschel Kasper's study[1] on the impact of collective bargaining on public school teachers finds little relation between unionization and average state salary levels. We contend that the Kasper regression equations do not fairly test the impact of teacher organization for at least three reasons:

(1) They use state data as observations in the cross sectional analysis in spite of the rather obvious concentration of unionization and salary determination at the local school district level.

(2) They use average salaries in the state as the dependent variable thus introducing sensitivity to the distribution of teachers through the steps in the salary scale as well as sensitivity to the degree of homogeneity among school districts in the state.

(3) They ignore the structure of the school districts in the state which we contend is an important offset or aid to goals of unionization.

In addition to these major objections to the Kasper study we also wish to raise several minor objections of a more technical nature to the methods employed.

Although conceptually separate, the problems of the use of average and state aggregation compound each other in practice to the point where we choose to discuss them together in Section II. The primary objections to the use of average salary as the dependent variable center around the assumption of a linear relation between collective bargaining and salary and lack of homogeneity among the districts. Section III deals with the importance of school district monopsony in the wage determination process.

II. Use of Average State Salary

Kasper's use of state average salary in the regression equations ignores a very important problem of aggregation. He implies, for example, that complete unionization of teachers in one fourth of all school districts in the state has the same

[1] Hirschel Kasper, "The Effects of Collective Bargaining on Public School Teachers' Salaries," Industrial and Labor Relations Review, 24, 57-72.

influence on average state salary as would unionization of one fourth of the teacher in every district in the state. We do not believe that this is the case. Far more likely is a threshold relationship such that some minimum level of union membership in the district is required before there is any noticeable impact.....and some highe level before the bulk of the union's impact is felt. In such a discontinuous functi two states with identical average unionization can produce strongly different result Ten percent unionization of the state's teachers spread evenly through all districts could be quite ineffective while the same percentage concentrated in one or two popu lation centers produces substantial increases in their compensation and thereby the state average.

Assume, for example, that the threat of unionization together with some union activity (defined as at least 5% membership) would result in a preventive increase in compensation of 2.5%. Assume further that a majority membership for the union (at least fifty percent of teachers in the district members) enables the union to obtain a premium of 10%, and that membership over 80% adds enough in solidarity to enable the teachers to obtain an additional 2%. The following chart illustrates how average state salary could be affected by distributing a constant average state unionization differently among ten districts of equal size.

ILLUSTRATION OF THE IMPACT OF INTRA-STATE VARIANCE
IN UNIONIZATION ON AVERAGE TEACHER SALARY

District	% Union	Salary	% Union	Salary	% Union	Salary	% Union	Salary
1	10	10,250	25	10,500	50	11,000	100	11,200
2	10	10,250	25	10,500	50	11,000	0	10,000
3	10	10,250	25	10,500	0	10,000	0	10,000
4	10	10,250	25	10,500	0	10,000	0	10,000
5	10	10,250	0	10,000	0	10,000	0	10,000
6	10	10,250	0	10,000	0	10,000	0	10,000
7	10	10,250	0	10,000	0	10,000	0	10,000
8	10	10,250	0	10,000	0	10,000	0	10,000
9	10	10,250	0	10,000	0	10,000	0	10,000
10	10	10,250	0	10,000	0	10,000	0	10,000
Average Salary	10.0	10,250	10.0	10,200	10.0	10,200	10.0	10,120

As this simple example illustrates, distribution may play a significant role in determining whether the state average reflects the presence of a union organization. Kasper may have had this in mind when he introduced the proportion of districts in the state covered by collective agreements (Equation 3.4 on pages 64-5). This variable, however, falls considerably short of the mark by equally weighting large and small districts in the state. Disaggregation to the district level is the only way to avoid this considerable source of bias. Since the real question is the effect of unionization on the salaries in organized districts aggregation above this level only serves to confuse the issue.

Another problem related to the use of state average salaries to measure the effect of unions is the nature of the market mechanism itself. One of the important reasons given for the stability of labor's share of national income over the years, in spite of unionization, is the depressing effect of unions on wages in surrounding sectors.[2] In the case of teachers such an effect is much more likely than in industry generally. High wages in organized districts would tend to reduce the number of teachers desired as capital is substituted for labor (in the form of teaching aids etc.). As states have a tendency to be closed systems (because of teacher certification requirements, the extent of secondary wage earners, and other geographic immobilities) and because other professions are not close substitutes for teaching employment, such a reduction of demand in organized districts will increase the teacher supply available in non-organized districts which will depress salary levels there. In such a closed system it seems unlikely that unionization (other than uniform) could ever raise average state salary significantly.

Other possible problems associated with average salary are introduced by (1) inclusion in the average of both highly qualified and marginal teachers, (2) inclusion of teachers at many different stages of their careers (and steps in the pay scale), and (3) teachers from areas very different in average income and general labor market conditions. Each of these objections deserves elaboration.

In those states with uniform and high requirements for teacher certification it may be reasonable to aggregate to state average salary.[3] Here the standard deviation among districts in teacher quality will be low. In states with relatively low requirements, on the other hand, there will be a substantial variation in teacher preparation and qualification among districts. This differential reflects in part variations in income and ability to pay and in part the preferences of the community for spending on public education. Averaging teacher salaries for states without regard

2. See especially [8] pp. 73-80.

3. Assuming that the districts within the state all have approximately the same level of unionization.

to their heterogeneity again invites error into the conclusion through faulty aggregation.

Teachers in the first years of their professional careers receive lower salaries than do similarly qualified teachers with greater experience. Aggregating districts where more teachers are in the first years of their career and districts in which the average experience of the teachers is much higher is invalid. Such aggregation does not help to isolate the effects of unionization but does induce a substantial source of variation which, depending on its correlation with unionization, could be either random or systematic. It would be much more reasonable to compare the starting salary level of teachers with bachelors degrees. The NEA collects data at this lower level of aggregation.[4]

Just as the effect of unionization should be a function of the distribution of union members between districts, so, too, the impact of income, state aid and other ability to pay parameters may depend critically on their distribution. Assume, for example, that the income elasticity of district spending on public education declines after some "normal" or "average" level of per student expense has been achieved. In this circumstance a higher level of spending for the state (and a higher level of salaries for teachers) will be associated wtih nearly equal distribution of ability to pay among the school districts in the state. A substantial element of unequal distribution would lower the average. This introduces an unknown bias when comparisons are made between states with various degrees of homogeneity. This bias will be reduced by state aid to the extent that it offsets the inequalities between districts.

III. Market Structure

Wage rates depend on product market structure as well as collective bargaining. In particular, we contend that the degree of monopsony power of the school district

4. Note that Kasper himself uses the entrance salary for policemen in comparing average teschers' salaries to the salaries of other public employees.

plays a critical role in the determination of salary levels.[5] A single large school district including virtually all of the teachers and students in a metropolitan area possesses monopsony power. A teacher desiring comparable employment within the profession must move to another city, a difficult alternative especially to a profession including so many secondary wage earners. On the other hand, many small districts in an area will compete against each other for the better teachers and in so doing increase the average wage. We have tested this influence in a sample of 135 urban school districts and found the number of school districts to be a strong and positive factor in the determination of starting salaries for new teachers with bachelor's degrees.[6] The following regression equations summarize this finding for the three sub-samples ((1) relates to districts with 25,000 to 50,000 students, (2) to districts with 50,000 to 100,000 students, and (3) to districts with more than 100,000 students).[7]

$$(1)\quad S_1 = 8.097 + \underset{(.060)}{.242}\, X_1^a + \underset{(2.012)}{7.582}\, X_2^a \qquad R^2 = .42$$

$$(2)\quad S_2 = 1.903 + \underset{(.076)}{.260}\, X_1^a + \underset{(2.545)}{9.966}\, X_2^a \qquad R^2 = .55$$

$$(3)\quad S_3 = 14.993 + \underset{(.102)}{.172}\, X_1^d + \underset{(4.295)}{6.339}\, X_2^d \qquad R^2 = .28$$

The significance of per-capita income (X_2) and the number of school districts in the county (X_1) indicate to us both the necessity of including the monopsony variable and the desirability of the district as the appropriate level at which to test the relation between product and labor market structure and wage rates. Monopsony power of local school districts will tend to offset the power of unions organization. On the other hand strong competition among suburban school districts and between them

5. This is true in other industries as well. See, for example [4].

6. Data collected from [6], [9], [10], and [11].

7. a indicates significance at the .995% confidence level, d indicates significance at the 90% confidence level. Standard errors are bracketed. The 135 districts in sample break down to 42 in classification (1), 69 in classification (2), and 24 in classification (3).

and the central city for teaching personnel may result in very high rates of compensation with or without collective bargaining. Certainly this factor cannot be completely ignored in attempting to isolate the independent role of teacher organization and bargaining.

IV. Other Issues

While our principal difficulty in accepting the conclusions of the Kasper paper involve the level of aggregation, there are at least two other aspects of this paper that puzzle us. These relate to the significance test used and the method employed in the two stage least squares estimation.

The first of these is a fairly minor statistical point. Kasper's hypothesis is that the average salary level is positively related to the level of organization. Therefore, in conducting his significance tests, we would naturally expect him to state as the null hypothesis that the regression coefficient for the organization variable is zero and as the alternative hypothesis that the coefficient is greater than zero. In other words, a one-tailed test is clearly in order. Kasper, however, employs two-tailed tests and thereby attributes less significance to his findings than is actually warranted by the data. For example, in his equation (3), Kasper states that the coefficients for the unionization variables are significant at the .10 level using a two-tailed test. If a one-tailed test had been used, the coefficients would be significant at the .05 level.

The second point about his statistical methods is much more serious. After employing ordinary least squares (OLS) to estimate a series of regression equations, Kasper procedes to employ two-stage least squares (TSLS) in an attempt to improve his estimates. This latter technique is a common method for estimating the parameters of an equation in a simultaneous equation model and therefore seems to be appropriate in Kasper's study since simultaneity likely exists between teachers' salaries and the extent of organization.[8]

[8] Several studies have shown that low relative salaries among teachers are associated with positive attitudes toward collective bargaining. For example, [3].

In the conventional use of TSLS, all of the equations in the system are first specified. Any single equation is then likely to have both endogenous (determined by the system) variables and exogenous (determined outside the system) variables serving as independent variables. In estimating the parameters in any single equation, the first stage is to obtain OLS estimates of the independent endogenous variables in that equation by regressing them upon all exogenous variables in the system.[9] In the second stage, the dependent variable in the equation under consideration is then regressed on the estimated values of the endogenous variables and the actual values of the exogenous variables that appear in that equation.

Kasper's use of TSLS is considerably different from that described in the previous paragraph. In his first stage, Kasper regressed an organization variable on six independent variables that he considered to be important. Three of these six had previously been shown to be significant determinants of teachers' salaries by his first sets of regression equations. In his second stage regression, Kasper used relative teacher salaries as the dependent variables and the first stage estimate of the organization variable as one of the independent variables. However, he dropped the three variables already shown to be important from the independent variables used in the second stage. The stated purpose for using this technique was to overcome multicollinearity. Since he reduced the number of variables in his final equation, Kasper indeed lowered the possible sources of multicollinearity. However, by dropping variables that are known to be important, he has also subjected his estimates of the regression coefficients to statistical bias and made even more difficult the assessment of the significance of these estimates.[10] We believe that this is a serious failing.

9. Where there are so many exogenous variables that this is impossible, it is more commonplace to select a smaller set of exogenous variables or to employ principal components of those exogenous variables. Michael D. McCarthy has shown [5] that the same set of first stage regressors should be used for each of the endogenous variables in any given structural equation and that this set should include the exogenous variables from the equation under consideration. If this rule is not followed, the estimates are not consistent.

10. Among others, see [1].

References

1. Carl F. Christ, Econometric Models and Methods, New York, 1966.

2. Hirschel Kasper, "The Effects of Collective Bargaining on Public School Teacher's Salaries," Industrial and Labor Relations Review, 24, 57-72.

3. D. Hellriegel, W. French, and R. Peterson, "Collective Negotiations and Teachers: A Behaviorial Analysis," Industrial and Labor Relations Review, April 1970, 23, 380-396.

4. J. H. Landon, "The Effect of Product Market Concentration on Wage Levels: An Intra-Industry Approach," Industrial and Labor Relations Review, 23, 237-247.

5. M. D. McCarthy, "Notes on the Selection of Instruments for Two Stage Least Squares and k-Class Type Estimators of Large Models," Southern Economic Journal, January, 1971 (forthcoming).

6. National Education Association, Salary Schedules for Teachers, 1966-67, Washington, 1968.

7. _____, Selected Statistics for Local School Systems, 1966-67, Washington, 1968.

8. A. Reese, The Economics of Trade Unions, Chicago, 1962.

9. Standard Rate and Data Service, Newspaper Circulation Analysis, 1967-68, Skokie, Illinois, 1968.

10. U.S. Department of Commerce, Census of Governments, 1967.

11. U.S. Department of Health, Education and Welfare, Education Directory, 1967.

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