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The Physical Structure of Regional Educational Service Agencies: Implications for Service and Equity Goals

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One of the assumptions underlying the organization and maintenance of regional educational service agencies, or, educational cooperatives, is that they enable districts to benefit from economies of scale. This study, using data from New York state's Board of Cooperative Education Services (BOCES), examines the interaction of district size and wealth factors with BOCES size and wealth factors as they are related to expenditure levels for service provision. A regression analysis shows that the physical characteristics of BOCES are significantly related to expenditure levels. ANOVA studies reveal a systematic interaction between district and BOCES characteristics, indicating that the investment levels of similarly structured districts in differently structured BOCES are significantly different. These results suggest that the opportunities available to districts through regional educational service agencies may depend upon their location, a fact that violated a basic premise of school finance equity.

Introduction

Issues of size have long dominated policy analysis and the research agenda of those who study rural school districts. It has long been assumed that rural school districts are unable to provide their students the breadth and depth of opportunities available to students in larger districts (Bass & Verstegen, 1992). While some recent research contests the point (Monk, 1987), this disadvantage is generally attributed to high production costs and limited resources (Campbell, Cunningham, Nystrand, & Usdan, 1975; Nachtigal, 1985; Pine & Keane, 1986). School district consolidation, where two or more school districts are reorganized into a single administrative unit, has been one policy by which to increase the operational size of small rural school districts and, hence, presumably capture the advantage of scale economies.

An alternative practice to school district consolidation has been the promotion of school district cooperatives, or Regional Educational Service Agencies (RESAs). In the mid-1960s, the Elementary and Secondary Education Act (Titles III and V) provided significant incentives for states to develop RESAs.[1] A school district cooperative is an organizational structure, often situated between the bureaucracy of the state and that of the district, that supports cooperation (Davis, 1976; Stephens, 1979). Such organizations are needed because the tasks of organizing, contracting, implementing, and monitoring cooperative arrangements can be complex, risky, and expensive. Bureaucracies are formed as a means of controlling the costs associated with governing risky and costly ventures (Schmidt & Kochan, 1977).

Prior to these legislative incentives, only a few states had formally integrated such organizations into their bureaucratic structure (e.g., Pennsylvania, Michigan, New York; Davis, 1976). This structure was pioneered by New York with the creation of their Board of Cooperative Educational Services in 1949. The premise of policies supporting the organization and finance of regional cooperatives is that increases in the scale of school organization result in reduced unit costs. In this article, I examine the relationship between measures of scale for RESAs and operational efficiencies. I conclude that the failure to recognize the complexity of organizational structure as it affects the capacity of cooperatives to organize and deliver educational services can result in significant and unequitable disparities among school districts. These findings suggest that educational policy makers need to reconsider the criteria by which RESAs are currently organized and perhaps funded.

Scale and Organizational Capital

The argument favoring the organization of public school districts into regional cooperatives is based largely on the assumption that a positive linear relationship exists between the operational size of organizations and their

[1]While it is recognized that school districts participate in many informally organized cooperatives, this study does not examine such arrangements. Rather, the focus is on formally organized state cooperative arrangements, especially those using public money to serve public purposes.

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production efficiency (Campbell et al., 1975; Cates, 1983; Davis, 1976; Ditzler, 1984; Nachtigal, 1985; Pine & Keane, 1986). That is, the capacity of schools to produce educational services efficiently increases as its operational size increases. Thus, increases in the size of an organization represent an accumulation of "organizational capital," analogous to the concept of human capital, that enables a higher level of productivity (Tomer, 1987).

Traditionally, educators and policy makers have defined the size of a regional education agency in terms of the numbers of students served (Campbell et al., 1975; Davis, 1976; Stephens, 1979). Some proponents of regional cooperatives have even asserted that an optimal size exists (somewhere between 20,000-50,000 students), above which administrators are able to achieve desired scale economies (Campbell et al., 1975; Schmidt, 1983; Stephens, 1979). This suggests that the cost of producing collaborative programs would be less in a cooperative of 25,000 students than in a cooperative of 5,000 students.

Enrollment, however, is not the only structural feature that affects an organization's capacity to produce services or goods. For example, the aggregation of wealth holds important implications for the operational efficiency of schools working together in collaborative arrangements. The capacity of a group of resource-poor schools to develop, produce, and deliver collaborative services differs significantly from a comparable set of wealthy districts working toward the same end. Two regional service agencies operating with identical base enrollments can differ in numerous other ways: the number of constituent district members, the aggregated geographic size of the cooperative, and the mix of district-level characteristics composing the collaborative (e.g., wealth, size).

Even if the relationship of enrollments were positively related to efficiency, the effect of these other structural variables is generally unknown and unexamined. Thus, one can ask whether all increases in the operational size of a cooperative contribute equally and positively to reductions in unit costs, or whether increases in some measures of size actually counteract benefits gained by the aggregation of other aspects of the collaborative. The answer to this question is important in its own right, but it is presented in this article as a necessary step to a second, and, perhaps, more important, question.

If all the structural variables examined in this research contributed unambiguously to the efficiency of cooperative organization, then enrollments stand as a valid proxy for the measure of "organizational capital" intended in policies promoting scale economies. Thus, one could argue that policies guiding the organization of bigger regional cooperatives are both appropriate to their goals and fair to constituent district members. True, it may be that districts in larger cooperatives operate with economies more advantageous than districts in smaller cooperatives, but the policies promoting scale would be addressing the problem.

If enrollment is not a valid proxy for the influence of other measures of organizational structure, then the effect of policies promoting increased scale through the aggregation of enrollments is unclear. The problem in this context is not whether scale economies exist, but, rather, whether the presumed incentives to participation in collaboratives are equally distributed among comparable districts in differently structured cooperatives. Policies promoting increases in the size of school organizations have typically assumed that the resulting economies generated would be equally accessible to all constituent members of the newly formed organization, but this may not be true. Thus, similarly structured school districts operating in differently structured regional agencies may derive different levels of benefit. Where state education agencies finance and support the organization of regional service agencies, such a situation would violate a fundamental equity principal: Equals should be treated equally. Thus, I examine the question: Are variations in the structure of RESAs associated with differences in the opportunities of similarly structured school districts participating in cooperative arrangements?

Method

I used two analytical steps to address the concerns introduced above. First, using regression analysis, I examined the relationship between variations in the structure of RESAs and the unit cost of services. This analysis confronts an immediate problem, however, because the measure of production costs is difficult to acquire. This problem is especially difficult for RESAs, where no clear production function is known nor are service characteristics necessarily comparable (Fox, 1981; Monk, 1987; Riew, 1986). To pursue a comparison of costs, therefore, I also relied on budgetary accounts of expenditures in the analyses below. Obviously there is a relationship between costs and expenditures, but they are not one and the same. To suggest that two RESAs operate with similar unit costs when comparing expenditures per pupil requires one to assume that the two agencies are providing the same intensity and mix of services. This may not be true.

There are reasons, however, to justify the use of expenditure data as a measure of comparison. First, the technology of education is similar wherever educational services are produced. Indeed, state requirements for educational services are often standardized and monitored, suggesting that the services offered in one cooperative are not terribly unlike those offered in another. Second, given the highly aggregated character of these expenditure categories within regional cooperatives, which include many districts and numerous programs, it is not likely that the average mix of

Table 1
Descriptive Statistics for BOCES Aggregated Structural Characteristics ($N = 35$)

BOCES	*M*	*SD*	Range
Base Enrollment	26,172	14,374	9,532 – 68,279
Average Assessed Value Per Pupil	126,885	33,414	78,516 – 200,841
Number of Districts Per BOCES	14.7	5.9	7.0 – 27.0
Total Geographic Size (square miles)	1,250	700.5	293.9 – 2,903
Heterogeneity of District Enrollment	0.761	0.207	0.281 – 1.164
Heterogeneity of Districts Assessed Value Per Pupil	0.526	0.336	0.181 – 1.655
Heterogeneity of District Sparsity	1.467	0.754	0.275 – 3.573

Data source: New York State Department of Education, SA 111 & SA 105, 1986.

services (however they are accounted for) are wildly different. Third, the expenditure data available distinguish between several programmatic areas that allow comparisons within comparable service areas (e.g., vocational and special education). Thus, one needs to recognize the limitations of the expenditure data as a proxy for cost unit; but since no other data are available, these data will have to do.

Data Source and Variables

I used data from the New York State Board of Cooperative Educational Services (BOCES) to examine the questions raised above. These data were from the 1986 school year.[2] While dated, the results of the analysis are intended to reveal relationships that address broad policy issues, and, hence, results from 1986 data are still relevant today.

Thirty-five of New York's 41 BOCES were included in my analyses (506 of the 723 school districts). The economic and demographic circumstances of the six BOCES close to New York City are different than the 35 upstate BOCES used in this study. For example, the 1986 median salary for BOCES teachers in the New York metropolitan area was approximately $35,000, while the median salary for upstate BOCES teachers was closer to $24,000.

For a number of reasons, New York State's BOCES offer an excellent opportunity to explore the relationship between the structure of a cooperative and district participation in cooperative ventures. First, district participation in BOCES activities is voluntary: District administrators can choose to participate in as many or few programs as they wish. Second, the BOCES system, organized in 1949, is well established, as are district responses to cooperative opportunities. Variations in district responses to BOCES services therefore are not a result of organizing new administrative structures. Third, there is considerable variation in the physical structure of BOCES—the independent variables in this study.

Table 1 provides a summary of BOCES structural characteristics used in the regression analyses. The first four of these measures (BOCES base enrollment, BOCES assessed valuation per pupil, number of districts per BOCES, and the geographic size of the BOCES) all are aggregated measures of BOCES structure. These figures were calculated by adding the figures for each of the constituent districts operating within their respective BOCES.

The last three variables describe the composition, or mix, of districts within BOCES. The statistic is simply the coefficient of variation (i.e., the standard deviation divided by the mean) of district level measures relative to their respective BOCES. The measures are not meaningful in and of themselves, but, rather, provide a measure by which differences in the composition of BOCES can be compared. Thus, with regard to variations in the district enrollment, some BOCES operate with almost no difference in their enrollment size whereas other BOCES operate with considerably more variation. Where common needs and consensus are important to the organization of cooperative ventures, these variations may provide an important insight about the capability of the BOCES to produce educational services efficiently (Benson, 1975; Hall, Clark, Giordan, Johnson, & Roekel, 1977; Levine & White, 1961; Molnar & Rogers, 1979).

School districts in New York State invested over $400 million in cooperative services during the 1986-1987 school year. Expenditures per pupil differ significantly among the 35 BOCES examined here. For example, the BOCES with the highest per-pupil expenditure is $817 compared to $309 for the lowest per-pupil expenditure. Expenditures for vocational and special education students are provided in Table 2; these accounts are calculated using full-time-equivalent student counts within the respective programs.

[2]Data source: New York State Department of Education, SA 111 & SA 105, 1986.

Table 2
Comparison BOCES Program Expenditures Per Pupil (in dollars)

	M	*SD*	Range
Total Expenditures Per Pupil	480.4	105.4	816.9 – 306.4
Administrative Expenditures Per Pupil	52.9	31.5	17.2 – 178.9
Vocational Education Expenditure Per Full-Time Equivalent Vocational Education Student	6,563.0	1,250.0	4,796.0 – 10,747.0
Special Education Expenditure Per Full-Time Equivalent Special Education Student	8,642.0	2,286.0	4,927.0 – 12,671.0
Other Program Expenditures Per Pupil	143.0	51.5	51.8 – 290.0

Note. Total Expenditures Per Pupil represents the aggregated total expenditure divided by the BOCES' base enrollment. *Administrative Expenditures Per Pupil* represents the aggregated expenditure for administrative services divided by the BOCES' base enrollment. *Vocational Education Expenditure Per Full-Time Equivalent Vocational Education Student* divides each BOCES expenditure for vocational education by the total number of FTE pupils. *Special Education Expenditure Per Full-Time Equivalent Special Education Student* divides each BOCES expenditure for Special education by the total number of FTE pupils. *Other Program Expenditures Per Pupil* accounts for all other expenditures divided by the BOCES' base enrollment. ($N = 35$ Upstate BOCES; Special Education $N = 15$.) Data source: New York State Department of Education, SA 111 & SA 105, 1986.

Results

Regression Analyses

The results of the regression analyses are not difficult to summarize: There is little systematic relationship between the expenditure categories and any of the structural variables. Because so few cases were used in the regression (only 35 BOCES), I ran two sets of regressions: one for the aggregated measures of structure and one for the composition (heterogeneity) measures.

Table 3 displays the results of the regression analysis of the aggregated measures of BOCES structure. Within this category of variables, I ran separate regressions for each of the expenditure categories. The only regression model that achieved statistical significance was for the expenditure category that included all service accounts (total expenditures per pupil), explaining only 21% of the variance. Thus, on the average, an increase in the base enrollment of a BOCES by 10,000 students is associated with a reduction in expenditures (the proxy used here for costs) of about $25 per pupil. In general, however, the findings do not indicate that a strong systematic relationship between measures of scale and unit costs exists.

A second set of findings indicates that the signs of the coefficients vary within and between the expenditure categories. That is, not only is the relationship between measures of scale and expenditure units weak, it also is unsystematic. Thus, where increases in BOCES size reduces unit expenditures, corresponding increases in the assessed valuation and geographic size of the organization are associated with increases in unit expenditures. Clearly, the relationship between measures of scale and unit expenditures is anything but simple and linear.

However, one cannot conclude from these findings that measures of structure are unrelated to expenditure and cost variables. It may be that the heterogeneity variables—measures of the internal composition of the BOCES—account for the expenditure variations. Or, it may be that the regression model is too simply conceived and evidence of the influence of structure can only be captured by examining the interaction of district level characteristics relative to BOCES structural variables.

None of the results of the regression of heterogeneity measures—measures of internal variation for district enrollment, district wealth, and district geographic size—on expenditure data was found to be statistically significant. On the face of it, heterogeneity measures seemed to provide an explanation for the degree of commonalty necessary to achieve the consensus associated with effective cooperation, but the empirical results do support such a hypothesis.[3]

The simple model of scale, as described at the outset, predicted a linear relationship between the structure of cooperatives and their expenditure levels. The fact that the relationship between these variables is so weak and inconsistent raises questions about the opportunities available for similarly structured districts in differently structure BOCES. My next set of analyses pursue this concern.

The ANOVA Study: An Equity Analysis

As noted above, policies promoting increases in the size of school organizations typically have assumed that

[3]The findings are very much like those of the aggregated measures of size presented above. Because of space constraints, these results are not reported.

Table 3
BOCES Characteristics Regressed on Categories of BOCES Expenditures[a]

BOCES: Expenditures Characteristics	Total Expenditure Per Pupil	Administrative Expenditure/ Per Pupil	Vocational Education Expenditure/ Vocational Education Pupil	Special Education Expenditure/ Special Education Pupil	Other Expenditure/ Per Pupil
Base Enrollment	-.0025[b]	-.0007	.0088	-.533	-.0002
	(.0017)[c]	(.0006)	(.0229)	(.0853)	(.0009)
Average Assessed Value Per Pupil	.0007	.0002	.0042	.0315	-.0003
	(.0005)	(.0002)	(.0069)	(.0279)	(.0003)
Number of Districts Per BOCES	-4.21	-.259	-58.76	151.02	-1.51
	(4.80)	(1.61)	(66.1)	(234.4)	(2.71)
Geographic Size (square miles)	.0237	-.0021	.4612	-1.670	-.0002
	(.0356)	(.0119)	(.4903)	(1.686)	(.0201)
R^2 (adjusted)	.21*	.01	-.07	-1.11	-.05

Data source: New York State Department of Education, SA 111 & SA 105, 1986.
[a]$N = 35$ except for Special Education, where $N = 15$.
[b]Unstandardized regression coefficients.
[c]Standard error.
*$p < .05$.

the resulting economies generated would be equally accessible to all constituent members of the newly formed organization. Failure to find empirical support for these assumptions does not necessarily gainsay the existence of production efficiencies. In this section, I examine the possibility that an interaction of district-level structural variables with BOCES-level structural variables produce an inequitable distribution of benefits.

A key feature of the analysis is a shift in the unit of analysis from measures of scale for the cooperative alone to an interaction of structural variables between the regional agencies and their constituent members. Increases in the size of a regional cooperative may affect its resource base and production capability, but an administrator's decision to participate in the collaborative opportunities would presumably depend upon the district's needs and resource capabilities. Assuming that districts administrators are free to invest in cooperative services or not, which, for the most part, is the case in New York, one can argue that differences in the district-level investments for BOCES services reflect differences in perceptions of the value of such opportunities. Voluntary investments in BOCES services is used here to measure access to opportunities, where higher levels of investment are interpreted to mean greater utility. Thus, as the unit of analysis shifts to measures of district structure, the measure of the dependent variable shifts to district level investments.

I report the results of two analysis of variance (ANOVA) studies. The analysis involves ranking enrollments and wealth for the 506 schools into quartile groups. Table 4 provides the descriptive statistics for the district-level variables used in this analysis.

BOCES ranked by base enrollment. The first ANOVA examines the relationship between categories of school districts ranked by enrollment within categories of BOCES ranked by their aggregated enrollments. The results suggest that investments for BOCES services differ significantly for districts, depending upon the BOCES category to which they belong.

The mechanics of the analysis are laborious since a separate ANOVA was run for each of the district decile groups. The results are presented in graphic, rather than tabular, form for greater elucidation. Figure 1 compares average expenditures for BOCES services by districts within BOCES of different size. The smallest quartile group included 9 BOCES with base enrollments between 9,525 and 17,548 students; the largest quartile group included 8 BOCES with base enrollments between 38,777 and 68,171 students. The districts within each quartile group of BOCES were ranked into decile groups, each of

Table 4
Descriptive Statistics for Districts ($N = 506$)

	M	*SD*	Range
Enrollment	1,803	1,722	50 – 11,445
Wealth[a]	$127,870.0	89,336.0	34,080.0 – 679,842.0
Per Pupil Expenditures for BOCES Services[b]	$263.3	116.9	57.4 – 889.1

Data source: New York State Department of Education, SA 111 & SA 105, 1986.
[a]Assessed valuation per pupil.
[b]Calculated by summing the investments of each district in BOCES services and dividing it by the number of students within the district.

which included at least 10 districts. The enrollments for the smallest decile group of districts ranged between 50 and 399 students; the largest decile group included districts with enrollments between 3909 and 11,445 students.

Several findings are evident. First, regardless of the size of the BOCES category, per pupil investments for cooperative services was higher for smaller districts. On the average (for the four groups of BOCES), the smallest group of districts spent about $220 per pupil more for BOCES services than did the largest group of districts.

More information about the nature of the services purchased would be necessary to interpret these expenditure differences. It may be that, relative to their budget for maintenance and operation, smaller districts purchased more BOCES services than did larger districts, or the expenditure differences may simply be a product of dividing similar purchases by different enrollment bases. The purpose of this study, however, is not to address within-group expenditure differences specifically, but, rather, to examine between-group differences where the confounding effects of per pupil investments is less an issue.

Comparing districts of similar size between the groups of BOCES ranked by enrollment reveals large and statistically significant expenditure differences. For example, investments in BOCES services for the smallest group of districts was about $125 per pupil more than similarly structured districts in the largest group of BOCES. It appears for these data that structure does matter, but not in

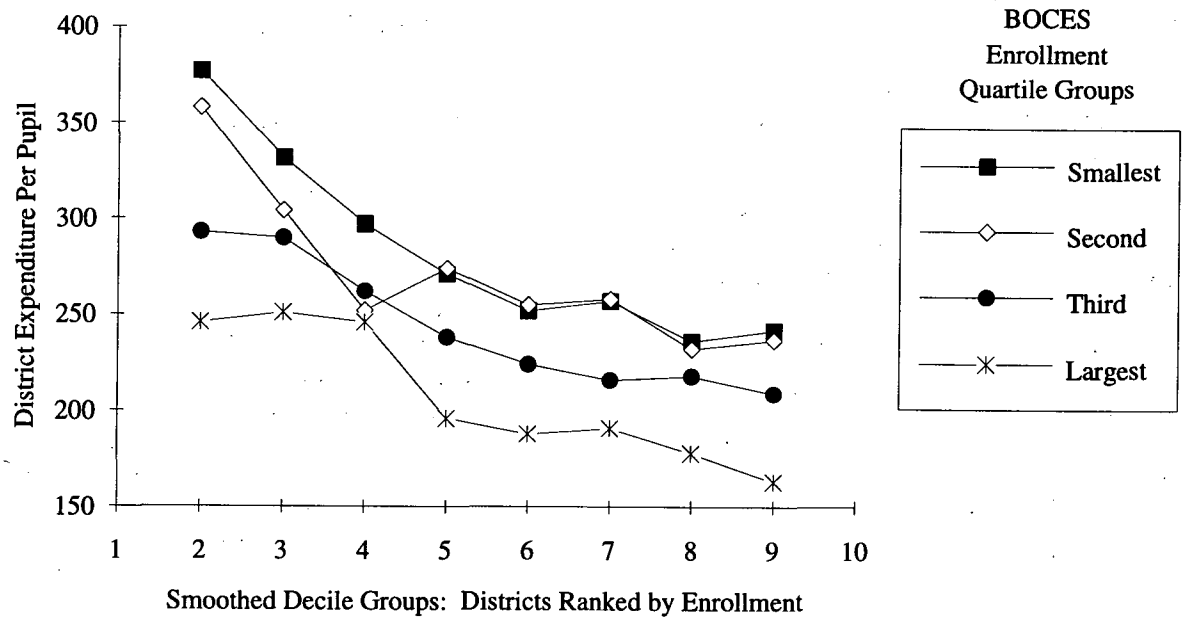

Figure 1. Comparing group mean expenditures for BOCES services districts within BOCES ranked by enrollment.

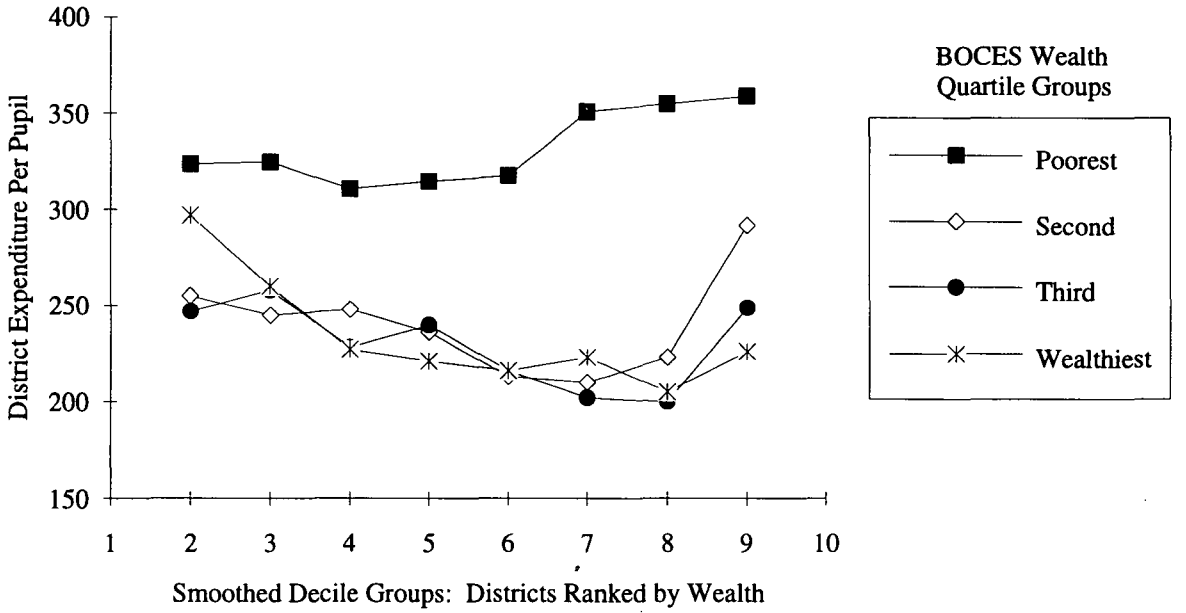

Figure 2. Comparing group mean expenditures for BOCES services: District wealth within BOCES ranked by wealth.

the simple linear model underlying most policies promoting the formation and organization of regional education service agencies like New York's BOCES. In the next section, I take up the influence of district wealth on district-level investments for BOCES services.

BOCES ranked by wealth. The results of the ANOVA comparing the investment patterns of districts ranked by wealth are presented in Figure 2. Each line in this figure, as in Figure 1, represents the expenditure averages for districts within a group of BOCES ranked by their respective measure of wealth.

The pattern of relationships in this analysis differs significantly from those found in the above analysis using enrollment data. First, the investment pattern for districts in the smallest (poorest) group of BOCES is distinct from the rest of the districts. Further, the slope for this group of districts is essentially flat, indicating that a relatively poor district in that group of BOCES invested at about the same level per pupil as a wealthy district did. Finally, the level of investment for districts in the poorest BOCES was about $100 per pupil more than for districts in any of the other groups of BOCES.

The investment patterns for districts in the three groups of wealthier BOCES should remove any doubt as to why the regression analysis did not reveal simple and linear evidence of economies of scale. Wealth does not appear to be a significant variable for district investment in BOCES, except perhaps in the poorest and wealthiest extremes. The pattern of results reveals a curvilinear relationship such that the investment levels for the wealthiest and poorest districts are comparable. The pattern of results revealed in this analysis is complex, but it substantiates the points made earlier: (a) structure matters and (b) the pattern of investment behavior for similarly structured districts varies with differences in the structure of the BOCES.

Discussion

One of the assumptions underlying the organization and maintenance of RESAs is that they enable districts to benefit from economies of scale. Recognizing the limits of the data available, I used expenditure data as a proxy for cost data to examine the assumption that increases in the scale of regional education service agencies are associated with reductions in per pupil costs. Judgments about scale economies are not easily made, but the results of the regression analysis clearly reveal a complex set of interactions among variables. This complexity was further illustrated in the ANOVA results, which revealed a systematic and significant relationship between the structure of the districts within BOCES and the pattern of district investment in BOCES services. Specifically, the investment levels of similarly structured districts are significantly different in differently structured BOCES. Such a situation calls into question a basic equity premise—that access to opportunity not be related to circumstances of location. These data raise doubt that such a principle is upheld in the current organization of regional service agencies.

The equity concern is related to another problem with the general character of policies promoting the formation of RESAs. That is, such policies seek to enhance the average welfare of the whole group and generally fail to consider how the benefits of such arrangements have been distributed among subgroups. This point has important implications for rural school districts because variations in the structure of the BOCES to which they belong are associated with their investment behavior. Assuming that the character of the services and conditions are similar across the highly aggregated groups of BOCES examined in this study, one can surmise that small-enrollment and resource-poor school districts do better in some organizational environments than others. Where rural, small-enrollment and resource-poor districts are identified as the reason for developing regional structures, current policies should be more sensitive to how the mix of organizational characteristics not only affects scale economies but also affects the targeted audience.

My research provides evidence that structure matters relative to the investment behavior of districts participating in RESAs. However, the data are not adequate to explain the variations observed; to do so would require good cost data, programmatic data, and outcome data. The task of getting programmatic data so that unit costs can be accurately calculated, along with measures of educational output, will be a challenge for future researchers. Student-level outcomes are not obviously relevant to the study of RESAs because most of the services provide by such agencies are intended to assist school districts directly providing students with educational opportunities. Tholkes (1991) and Monk (1987) compare curricular offerings as a measure of educational output. Detailed, qualitative studies will be necessary to examine how participation affects the district level operations. These studies could address questions about how benefits of participation manifest themselves, whether participation in cooperative projects is associated with a substitution effect or required expansion of services.

Finally, rural school administrators, with the complex demands on their budgets and staff, need to better understand how the organization and funding of regional centers affects them. It may be no surprise to rural educators that some collaborative ventures are less advantageous to them than to other members of the arrangement. What may be less well known is that arguments in favor of efficiency need not sacrifice equity concerns. While policy-makers rightfully should be concerned about achieving greater levels of operational efficiencies, the pursuit of such a goal seems inconsistent with concerns about how the benefits are distributed. The analysis presented here frames a way of thinking about pursuing both goals simultaneously. Again, recognizing the complex framework suggested in this research requires more effort on the part of state agencies promoting and regulating regional type agencies, but in consideration of their responsibility for ensuring the equitable access to these and other educational opportunities the burden seems fairly placed.

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