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# State Aid to Public Schools: An Analysis of State Responsiveness to School District Needs

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# STATE AID TO PUBLIC SCHOOLS: AN ANALYSIS OF STATE RESPONSIVENESS TO SCHOOL DISTRICT NEEDS<sup>1</sup>

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Despite decades of attempted fiscal reforms throughout virtually every state, most state school aid is still allocated on a per pupil basis. The chance exists, nonetheless, that the remaining funds are at least somewhat targeted to socioeconomic or fiscal need. This research, covering two recent time periods, finds little evidence that non-enrollment-based state aid is targeted to need.

A major issue in intergovernmental relations is the degree to which state or federal aid reaches those individuals, groups, or places with the greatest need. One of the textbook justifications for intergovernmental assistance, especially federal aid, is that such funds often perform an important redistributive function. This rationale is based on the assumption, of course, that such assistance to some extent does reach those that need it most. This issue of targeting has taken on new significance recently as the federal government, under Reagan's New Federalism, has attempted to return more power, discretion, and funds to state governments. To the extent a more state-centered federalism emerges, is this likely to improve or diminish intergovernmental responsiveness to the needs of lower-level governments? How effective have state aid programs been in the past in assuring that funds reach those most in need?

Recent literature at the city level has analyzed state responses to city need. For example, a number of studies (Dye and Hurley, 1978; Stein, 1981; Pelissero, 1984) have found that state aid programs are somewhat responsive

<sup>1</sup>We would like to thank James Granato for help with the data collection. This article is a revised version of a paper presented at the 1985 Midwest Political Science Association annual meeting. We also appreciate the helpful comments and advice from the anonymous reviewers. Editor's note: Reviewers were Thomas Dye, David Lowery, Robert Stein, and Frederick Wirt.

to a combination of the social, economic, and fiscal needs of cities. Even though an enormous literature deals with state aid to local public schools, little research has focused on the extent to which such intergovernmental assistance is targeted on socioeconomic need. States continue to funnel vast sums of money to public schools; in fact, the proportion of state funding of local schools has risen steadily over the past several decades. Much of this aid has been designed to achieve educational equality, broadly defined, in short to partly overcome the vast differences in school district funding capacity found in almost every state. Evidence suggests that some progress has been made (Carroll and Park, 1983:155), but controversy still exists over the extent to which state funds have helped overcome the enormous socioeconomic and fiscal disparities that characterize local school districts in this country.

The purpose of the present research is to determine just how responsive states are to the needs of local school districts. Initially we begin with a brief account of the traditional basis by which states provide funds for local districts. Special attention is devoted to the concepts of equity and need as applied to school finance. The purpose here is to consider the rationale that states have a special obligation to provide extra financial resources to assist certain groups that have special needs. Then, an empirical analysis undertaken using data from the 173 largest public schools in the nation is described. The dependent variable is state aid to school districts, exclusive of federal passthrough funds, using a measure adjusted for student population differences across school districts. Our basic hypothesis assumes that states allocate the largest portion of non-enrollment-based aid according to school district needs.

## State Aid and Educational Equity

As a recent assessment of equity in school finance observed, "Throughout the Twentieth Century, the criterion of fairness has been continually applied to the American system of education" (Berne and Stiefel, 1984:270). But fairness for what or whom? Berne and Stiefel (1984:7) contended that equity applies to two groups—children and taxpayers—and that most reform efforts try to take account of both in devising various state aid formulas. Although this is not the place to provide a detailed discussion of the history of the movement to equalize educational funding, we do need to consider briefly the various concepts of equity and to weigh the arguments in behalf of using state money to level up poor districts.

For a good bit of this century educational reformers have searched for ways to reduce interdistrict disparities in per pupil expenditures (see Friedman and Wiseman, 1978). The problem has been, quite simply, that, since local support for public education comes predominantly from the property tax, local school

funds are determined largely by the property wealth of the district. In fact, under one definition, equity exists when a child's educational opportunity does not depend on his or her parent's economic circumstances or geographic location (Wise and Darling-Hammond, 1981:298). State aid has been viewed historically as one important means of weakening this link between local resources and school spending.

More recently, a renewed effort to channel greater state resources to needy districts has swept the country. A number of states now distribute funds specifically for various categories of "disadvantaged" students, while nine states offer specific adjustments for poverty (Goertz, 1981). In all, this movement to improve equity has been termed the educational issue of the 1970s, as some 28 states reformed their system of school aid largely in hopes of improving funding equity (Fuhrman, 1982). Some contend this effort has paid off. According to Odden (1982), "Important progress was made in reducing the relationship between per pupil expenditures and local property wealth per pupil, with the reform states making more progress on this goal" (p. 316). Others (Geski, 1982) have disagreed. Thus the extent to which recent events have reduced the historical nexus between local wealth and school spending appears to require further investigation.

An analysis of the extent to which state money reaches districts most in need should proceed within the context of an overall examination of those factors that determine the distribution of state aid to local schools. Empirical research on this subject in which a large number of districts are used is less prevalent than expected. Most of the studies include state aid as one of several variables to explain variations in per pupil expenditures, with a particular concern for the extent to which state funds have an equalizing effect. The basic conclusion: "Where there is greater relative use of state aid, there is consistently less inequality of expenditures" (Harrison, 1976:50). In effect, considerable research suggests that those districts with fewer financial resources tend to receive proportionately more state aid than other districts.

The literature on state funding indicates no clear-cut pattern with regard to the effects of the distribution formula itself. Cohn (1974:37) argued that the type of financial plan used and the percentage of state funds relative to total school costs are the two most important variables determining the equalizing effect of state aid. Brown and Elmore (1982:132), however, insisted that the type of formula employed is not the decisive factor in determining the equity impact of state funding. At this point, then, we will tentatively assume that the amount of non-enrollment-determined state aid received by local districts will be unrelated to the type of distributional formula used, when other variables are taken into account.

One other potential influence on state aid should be considered. Johns and associates (1983:167) insisted that where a state contains a large number of districts, each individual district is likely to receive proportionately less

state money. It may be simply a matter of not enough money to go around. Thus we expect that districts will receive less aid in those states that have a large number of districts per unit total population.

A final issue must be dealt with before proceeding to a discussion of the data and methods employed in the analysis. Most grant-in-aid programs are heavily population based. For example, federal grants to states are allocated almost entirely on the basis of population (Copeland and Meier, 1984). Likewise, Pelissero's (1984) research on state aid to municipalities confirmed the close association between total aid received and city population. Therefore any concern with the extent to which aid reaches those places needing it most must come to grips with the impact of population.

By the beginning of this century state funds were distributed to local districts almost altogether on the basis of equal dollars per pupil (Garms, Guthrie, and Pierce, 1978:188). Despite a variety of schemes to equalize funding and to promote efficiency, most state aid programs in recent years have remained closely tied to district enrollments. Thus we fully expect total state aid to local schools to be enrollment driven. As suggested at the outset, however, our interest is in determining the extent to which aid reaches needy districts when enrollment differences are excluded. So the analysis here is based on a measure of state aid to school districts with the effects of enrollment removed.

Once enrollment-based influences on state aid have been removed, the expected relationships might be summarized as follows:

1. Districts with greater socioeconomic need will reflect higher aid payments;
2. Those districts with the greatest fiscal need will receive proportionately more state aid;
3. The more school districts in a state (per unit population), the smaller the amount of aid each will receive;
4. The amount of aid per district will be unaffected by the type of distribution formula employed by the state;
5. Efforts to reform the state aid system (over time) will only marginally increase state assistance to school districts.

### Data and Methods

Initially a further elaboration is needed on the dependent variable—state aid to local public school districts. A common approach to handling population effects is to create per capita measures.<sup>2</sup> Yet when dealing with

<sup>2</sup>A debate persists over the use of per capita or other transformations of variables in research on state aid to local governments. In brief, Uslander (1976) and Ward (1981) contended that per capita measures should be used with caution and only when theoretically justified. Lyons (1977) insisted that the failure to apply per capita transformation when population covaries with other

intergovernmental aid, Pelissero (1984) has suggested an alternative dependent variable that permits the researcher to concentrate on the proportion of aid not determined by population. This can be done by regressing state aid on school district enrollment figures to produce a residual aid measure free of the confounding effects of enrollment. The formula essentially assumes the following:

$$\text{State Aid} = f(\text{Enrollment}) + \text{Error}$$

The residualized measure thus created represents that portion of state money that is allocated on some basis other than enrollment.<sup>3</sup> Residual state aid for the 173 school districts is then examined at two time points, 1971 and 1981. Because of the flurry of public school finance reform activities during the 1970s, we suspect that states were not good targeters during the initial period. By 1981, however, more responsiveness to local socioeconomic and fiscal needs should be apparent. (The identical 173 school districts are employed in both years' analysis.<sup>4</sup>)

Next the various indicators of the districts' fiscal need should be described. The most commonly used measure is property value per student, although some studies also include family income. Unfortunately district property values are not widely available across states. In lieu of such a measure, this analysis will include the following as fiscal need variables:

1. school district budget deficit (revenue less expenditure) per pupil (1971, 1981);
2. local revenue base (own-source revenue) per pupil (1971, 1981).<sup>5</sup>

District socioeconomic need will be represented by the following *school-district*- (not city-) level measures:<sup>6</sup>

measures is "a dangerous strategy," since "without per capita transformations everything would be related to everything" (p. 182).

<sup>3</sup>Using per capita dependent variables was considered as an alternative strategy. An analysis using both a residual measure of state aid and a per capita measure was undertaken. The results were quite similar in large part because these two types of aid measures are very much alike. This appears in the simple correlation between residual state aid and per capita state aid:  $r = .82$  in 1971 and  $.84$  in 1981.

<sup>4</sup>These school districts include many large county and areawide districts in addition to the majority of central city districts. Districts excluded because of incomplete information or strong deviations from the sample were: Hawaii Schools, Houston Independent, Los Angeles Unified; Louisville City, Montgomery County (Maryland), New York City, North East Independent (Texas), Philadelphia, St. Louis, and Sweetwater Union High (California).

<sup>5</sup>Data on school district finances are taken from *Finances of U.S. School Districts, 1970-71* (Washington, D.C.: National Center for Education Statistics, U.S. Department of Health, Education, and Welfare, 1976) and *Finances of Public School Systems in 1980-81* (Washington, D.C.: U.S. Bureau of the Census, 1983).

<sup>6</sup>Data on school district socioeconomic characteristics are from *Social and Economic Characteristics of U.S. School Districts, 1970* (Washington, D.C.: National Center for Education Statistics, U.S. Department of HEW, 1976) and *Census of Population and Housing, 1980*, Summary Tape File 1F, 3F (aggregated by school district).

Per capita measures of the socioeconomic variables were employed in this analysis because they were more readily available in the above sources. The use of certain residual measures of

1. percent minority (black and Hispanic) (1970, 1980);
2. percent poverty (proportion of children from poverty-level homes) (1970, 1980);
3. unemployment rate (1970, 1980).

Several other variables representing state-level differences include:

1. number of public school districts per 10,000 population (1972, 1982);
2. a dummy variable representing whether or not the state significantly reformed its state aid program between 1971 and 1981;
3. a measure of the proportion of state aid allocated on some "equalizing" basis (1972, 1982).<sup>7</sup>

### Analysis

The first stage in the analysis involved testing the effects of enrollment on state aid. As expected, district enrollment is the principal determinant of state aid to school districts. The models below show the relationship between state aid to school districts and enrollment for both 1971 and 1981:

$$\text{State Aid (71)} = -\$3,083,839 + \$393.35 \times \text{Enrollment}$$

$$r^2 = .88 \quad \text{Standard Error} = \$7,542,011$$

$$\text{State Aid (81)} = -\$8,149,607 + \$1,414.51 \times \text{Enrollment}$$

$$r^2 = .90 \quad \text{Standard Error} = \$21,161,362$$

In 1971, 88 percent of the variability in state aid was accounted for by enrollment; by 1981 that figure had reached 90 percent. That explained variance is virtually identical for both time periods clearly suggests the lack of any growing impact of non-enrollment-based factors. The above figures also show that for every new enrollment the average district should have received about \$1,415 for 1981 compared to only \$393 in 1971. These figures may be a bit deceptive, however, since school funding increased so dramatically during the decade of the 1970s. In 1971, state aid to all local schools was \$17.6 billion; by 1981 that figure had reached \$50.2 billion, an increase of 186 percent. If that percentage increase were applied to the 1971 slope (\$393), we would expect a slope for 1981 of only about \$731 per pupil instead of \$1,415. If state aid had become less tied to enrollment,

socioeconomic need in this analysis, following Pelissero (1984), did not change the substantive findings, largely because of the close similarity between the two transformed measures. For example the correlation between percent unemployed and residual unemployment was very high:  $r = .68$  in 1970 and  $.70$  in 1980.

<sup>7</sup>State system data were obtained as follows: (a) number of school systems (1972, 1982), spending per pupil (1971, 1981), and state aid provided on an equalizing basis (1982) from the *Census of Governments* for 1972 and 1982; (b) proportion of public school funding provided by the state, 1971, 1981, from *Book of the States* for 1972-73 (p. 312) and 1984-85 (p. 365); (c) state aid provided on an equalizing basis for 1972 from *Public School Finance Programs, 1971-72*, Table 1; and (d) finance reform activity from Brown and Elmore (1982:108).

a much smaller increase in slope should have occurred over the ten-year period.

In effect, it appears that for most large districts around the country all the activity by state government during the 1970s to improve educational equity has gone for naught. Enrollment is the dominant force determining state aid as much now as ten years ago. We should hasten to add, of course, that a hefty amount remains to be allocated on some other basis. Thus we employ the residuals—that 10 or 12 percent of state aid not determined by enrollment—as the new dependent variables for the remaining analysis.<sup>9</sup> The important questions at this point are the following: How much of the residual aid is associated with district socioeconomic need? How much is targeted to the fiscal needs of the school districts? And, how important are state system variables in the determination of this residual?

Table 1 displays the multivariate model of residual aid and two of the need variables that are significant simple correlates of aid in either 1971 or 1981. (The minority, poverty, and deficit measures did not attain significance.) For 1971 both the socioeconomic need variable (unemployment) and the fiscal need variable (own revenue) are significant determinants. Own revenue per pupil is the strongest need predictor, with school district unemployment also a prominent effect. This initial year model demonstrates that higher residual state aid payments were, as expected, associated with greater need in school districts. Specifically, for every dollar per pupil that a school district was able to raise on its own there was a corresponding decrease of \$9,776 in residual state aid. Likewise, a 1 percent increase in a district's unemployment was associated with more than a \$1 million increase in such aid.

The 1981 model shown in Table 1 differs slightly from the earlier year's equation. Again, own revenue per pupil is the strongest predictor, with each one dollar per pupil increase in own-source revenue producing a \$9,094 decrease in state aid. District unemployment also continues to be significant. A 1 percent increase in unemployment among school district residents was associated with an increase of nearly \$1.7 million in non-enrollment-based state school aid. The overall model for 1981 reinforces what was found in 1971—residual state aid is at least partly determined by the district's needs.

Hypotheses 3 through 5 address the relationship between residual aid and several structural components of the state systems. While distributing state aid on an equalizing basis did not correlate significantly with the dependent variable, the other two state system measures—school systems per 10,000 population and school finance reform—were important enough correlates in

<sup>9</sup>Ten percent of state aid is still a large sum of money. For our 173 school districts, there was an average of \$2.4 million in non-population-based state aid in 1971 and an average of \$6.2 million in 1981.

TABLE 1  
Multiple Regression of Residual State Aid to Public School Districts  
on School District Need Variables in 1971 and 1981 ( $N = 173$ )

Predictors	1971		1981	
	<i>b</i>	Beta	<i>b</i>	Beta
<i>Socioeconomic Need</i>				
Unemployment (%)	1,041,746.74*	.16	1,668,432.93*	.21
<i>Fiscal Need</i>				
Own revenue/pupil	-9,775.84*	-.29	-9,094.39*	-.21
(Constant)	1,905,803.34		-1,905,464.60	
$R^2$	.11		.09	
<i>F</i>	10.20*		8.75*	

NOTE: Residual state aid is unstandardized. The dependent variable reflects the actual dollar difference between the observed state aid and that predicted by school district enrollment. A similar regression using the standardized residuals produced identical regression coefficients (beta,  $R$ ,  $R^2$ , and  $F$ ). Only the unstandardized slope coefficients (*b*) and the constants are different in the analysis reported here.

\* $p \leq .05$ .

TABLE 2  
Multiple Regression of Residual State Aid to Public School Districts  
on School District Need and State System Variables,  
1971 and 1981 ( $N = 173$ )

Predictors	1971		1981	
	<i>b</i>	Beta	<i>b</i>	Beta
<i>Need Measures</i>				
Own revenue/pupil	-9,264.78*	-.28	-9,297.32*	-.22
Unemployment (%)	1,061,655.68*	.16	1,708,502.99*	.21
<i>State System Measures</i>				
School districts/10,000 population	-1,250,467.44*	-.17	1,102,946.76	.04
School finance reform	4,582,230.93	.10	6,483,633.01	.14
(Constant)	2,396,273.79		-7,330,507.81	
$R^2$	.14		.11	
<i>F</i>	6.99*		5.37*	

NOTE: Residual state aid is unstandardized. The dependent variable reflects the actual dollar difference between the observed state aid and that predicted by school district enrollment. A similar regression using the standardized residuals produced identical regression coefficients (beta,  $R$ ,  $R^2$ , and  $F$ ). Only the unstandardized slope coefficients (*b*) and the constants are different in the analysis reported here.

\* $p \leq .05$ .

both 1971 and 1981 to use in the subsequent analysis. Therefore, in order to produce a more complete model of residual state aid, Table 2 combines the need predictors with these two measures of the state school system.

Clearly, the local need measures are more important determinants of residual aid than either of the remaining state system variables shown in Table 2. The key factor appears to be a district's own-source revenues; more residual aid is found among districts that raise less revenue on their own in both 1971 and 1981. The state system measures are largely insignificant predictors, with the exception of school districts per 10,000 population in 1971. In that year, as expected, a larger number of districts in a state has a negative effect on individual school district aid receipts. Unfortunately, neither model in Table 2 explains more than 15 percent of the variance in residual state funding. But the basic hypothesis regarding the importance of district need in this residual portion of state aid to public schools enjoys some support.

### Discussion and Conclusion

The analysis provides very little confirmation for the initial hypotheses regarding the relationship between residual (non-enrollment-determined) state aid and school district need. The literature at the city level suggests that state aid generally has been targeted to need. The results here, however, suggest only a tenuous such relationship for school districts. Only one socioeconomic measure (unemployment) was found to be related to residual aid, but it took on increased importance by 1981. School district fiscal needs also play some part in the aid allocation process; districts with fewer resources of their own did receive greater amounts of non-enrollment-determined state assistance.

Finally, we should acknowledge the impact of state system variables on residual state aid. The number of school districts in a state (per 10,000 population) was a moderately important predictor, but only in 1971. We expect that the change to larger aid payments in states with more districts by 1981, though insignificant, may be a result of the consolidation efforts during the 1970s that reduced the number of schools for states to support.<sup>9</sup> Consolidation was one of the school reformers' goals—an accomplishment that they expected would lead to more efficiency and, presumably, greater equity in school finance policies by the state (Johns, Morphet, and Alexander, 1983). Yet, the impact of finance reform on residual state aid was no more important for these districts following the changes of the past decade than it was in 1971. On balance, reforms do not appear to matter as much as other factors in the residual state aid receipts of these school districts.

<sup>9</sup>The state governments for our 173 school districts supported an average of .73 districts for every 10,000 state residents in 1971. By 1981, consolidation in the states had reduced this figure to .62 districts for every 10,000 state residents.

Although these findings confirm much of the previous research on state aid to local schools, there are several ways in which this study is different. Our analysis focuses more directly than other research on that component of aid that is not determined by enrollment. And those assumptions about the interplay between district need and state aid have been tested with a sizable sample of the nation's largest school districts. The use of two time periods provides a perspective over time that has often been lacking in earlier research. More particularly, our knowledge of the determinants of aid has been extended in several ways. First, this analysis reveals that overall state aid is as enrollment driven in the early 1980s as it was a decade earlier. This finding supports those who have argued that on balance the various reforms to state aid systems implemented during the 1970s contributed little or nothing to greater educational equity. Second, the analysis of residual state aid shows little targeting on the basis of a district's socioeconomic needs. Some responsiveness to district fiscal needs is apparent, however. But perhaps less so now than ten years ago. Further, it is not the particular formula for distributing aid that matters, nor do state school finance reforms and the number of school districts in a state appear to affect state aid more than marginally. Finally, while the regression models do not explain the majority of the variance, we should remember that 90 percent of this aid variance has already been explained by district enrollment. We have simply attempted to explain a bit more of the remaining variability in school aid allocation.

We do not intend to suggest that these models of residual state aid provide a complete picture of how state aid is allocated to local districts. But some important assumptions have been tested using the best data available at this time. Hence, we believe the limitations of the model (or its specification) are largely attributable to the data at hand. Such limitations can only be overcome, we suspect, through a more detailed analysis of intrastate variations to school district need. This appears to be the next step for researchers seeking to understand the differences between the responsiveness of "State A" versus that of "State B" in the school aid area. A state-by-state examination of state policy in funding local school costs would also control for the effects of 50 separate state aid systems—the existence of which we tried to address by including the state-level factors as part of the cross-sectional analysis.<sup>10</sup> At

<sup>10</sup>One reviewer has objected to using cross-state data to test the basic hypothesis that residual aid is being targeted to local districts on the basis of need, insisting that only an intrastate analysis can answer this question. No doubt, intrastate analysis is crucial. But in the meantime we contend that information about whether St. Paul receives more or less residual aid than Gary, when certain characteristics of the state's funding system are taken into account, is indeed useful in addressing the issue of responsiveness. This cross-sectional analysis of pooled data also permits us to learn more about how the largest school districts in the country are treated by the states. These districts generally have the greatest problems and needs, which place a heavy burden on state governments. (These large districts represent only about 1 percent of all the school districts in the country, yet in 1981 they collectively received about 30 percent of all state aid.) Moreover, most states

this point we simply conclude that non-enrollment-based state aid is only somewhat responsive to school district needs. SSQ

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have only a few districts with large (25,000+) enrollments, and an in-state analysis of such states' responsiveness may not be very revealing. Therefore we think a pooled data set can be used to do a comparative analysis of state responsiveness to answer the question: do those needy districts around the country receive more state assistance than their better-off counterparts? Whatever the answer in general, a comparative intrastate analysis undoubtedly would reveal that some states are better targeters than others. Nonetheless, we contend that the overall question can be addressed profitably with the design employed here.

*State Responsiveness to School District Needs*

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# INTERGOVERNMENTAL AID FOR CITIES AND SCHOOLS: A COMMENT ON RESEARCH METHODS

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The literature on intergovernmental aid and its responsiveness to needs in cities and school districts has been growing since the mid-1970s. Researchers have explored the fundamental political question of "who gets what" from alternative perspectives that have enriched our understanding of federal and state aid for local governments. This research has also stimulated discussion and debate over two policy analysis questions: (1) how to control for the confounding effects of different population bases in cross-sectional studies of aid receipts by city governments and school districts; and (2) how to account for differences in state aid systems when analyzing a pooled cross-state data set of local governments. These questions are again addressed in the Pelissero and Morgan article and the piece by Lyons and Fitzgerald in this issue. Since Lyons and Fitzgerald take a strong position regarding certain methodological issues evolving from these questions, a position that objects specifically to certain techniques we employ to control for the effects of population, we think a response and further elaboration on our part is appropriate.

Lyons and Fitzgerald deal first with the basic question of how to control for population differences in cross-sectional analysis of state responsiveness to city needs. This issue, first raised in the intergovernmental aid literature in Ward's (1981) critique of Dye and Hurley's (1978) responsiveness research, concerns the appropriateness of per capita measures of city government aid receipts and social and economic need. What we have done in the analysis of school district aid in this issue and in our separate research (e.g., Morgan and England, 1984; Pelissero, 1984, 1985) is to explore alternative means of studying state aid responsiveness. We have not and do not reject per capita measures as inappropriate in all state and urban policy research, as suggested by Lyons and Fitzgerald. Rather, we search for ways to better understand intergovernmental aid allocations that are population-driven—whether of federal (Coneland and Meier, 1984) or state origin (Ward, 1981; Pelissero

1984, 1985; see also our foregoing article in this issue). Specifically, our analyses have looked beyond the population- (or enrollment-)driven portion of state aid to the remaining 10–15 percent of state aid that is not determined by population. Obviously, if one is to examine all state aid allocations, an adjustment for population is necessary; hence the reason so many have employed per capita measures. But since we accept the explanation that population (rather than need) determines the bulk of aid, we have devoted our analysis to what we contend is a more interesting question. That is, what explains the allocation of the thousands of dollars in state aid *after* population effects are determined? We try to answer that question by using a regression-based technique to create residual measures free of population effects. This requires, for example, regressing total state aid dollars on the population of the receiving unit of local government. What remains is a residual measure of aid in dollars from which the effects of population have been removed.

The use of residual measures of aid is appropriate for such an analysis (Kmenta, 1971:201–5) because residual measures (1) are derived from a linear transformation rendering them well suited for use in the general linear model; (2) are independent of population, or the variable used to produce them; and, most importantly, (3) permit one to examine the discretionary portion of state aid and those factors influencing its allocation (e.g., state/local politics, local needs, legal-structural arrangements). Further, as Lyons and Fitzgerald acknowledge, a dependent variable residualized by population is interpretable. Far from producing “artifacts,” the residual analysis provides another way of exploring the responsiveness issue, a method that does follow the logic of social theory in key ways.

First, we are attentive to important components of social theory and do examine population and enrollment influences. Enrollment is the first variable taken into account in our study of aid to public schools, for example, and it alone explains from 88 to 90 percent of the variation in state school assistance. This is an important finding, one which we do not ignore. Indeed, learning that school aid is still largely enrollment-driven despite more than a decade of school finance reform is quite significant. Beyond that, we want to know what else matters in aid receipts of local governments. Second, population/enrollment adjustments in the predictors of residual aid are appropriate, although the form of the independent measures (residual or per capita) is somewhat subjective. The key question is, Would the *substantive* results change significantly if the other form of the variable (i.e., per capita) were employed? In our case the coefficients in the regression or correlational analysis would be different, but the findings would still be the same. One of the reasons for this is the close similarity between the two measurement forms of the same concept. This can be seen by correlating the per capita (or

percentage) and residual measures of the same 1970 social need predictors used in Pelissero (1984):

$$\begin{aligned} \text{NonwhiteRes} - \% \text{Nonwhite} &= .82 \\ \text{ElderlyRes} - \% \text{Elderly} &= .82 \\ \text{PovertyRes} - \% \text{Poverty} &= .83 \\ \text{MobilityRes} - \% \text{Mobile} &= .62 \end{aligned}$$

The same concept is being measured with either indicator when the correlations are so high. The substitution of the per capita measures for residual need measures in the regression analysis produces different coefficients, but the same finding emerges; residual aid to cities in 1976 is responsive to economic and fiscal need but has not improved in its targeting to social need from the 1962 pattern (Pelissero, 1984: tables 3 and 4).

The second question—how to account for difference in state aid systems when analyzing pooled data—is an additional concern of Lyons and Fitzgerald (in their comments on Pelissero, 1985). This concern is addressed in footnote 10 in our article in this issue, in response to the same point made by one of our referees, and in our conclusion to that paper. First, we admit that the ideal design would allow for an intrastate analysis for the reasons outlined by Lyons and Fitzgerald. Quite often, however, data are not available for cities or school districts below a certain size, either 25,000 or 50,000 population. In such cases, the *N* within any one state may be quite limited, precluding a thorough cross-sectional analysis. In some instances, it may prove possible to gather enough data on a large group of local jurisdictions within certain populous states to reach a respectable total *N*. Unless one wants to generalize from only that one state or perhaps from only a very few such large states, or unless a massive nationwide data set is available permitting intrastate analyses within a large number of states, the problem is not easily resolved.

In our foregoing article we try to take account of various state differences in school structure as a partial substitute for individual state variations. This option is not altogether satisfactory, but should control for some of the potential level-of-analysis problems raised by Lyons and Fitzgerald. Their criticism, of course, can be levied at any effort to assess variations in targeting by state governments that relies on cross-sectional pooled data across a number of states regardless of the technique employed to create the independent and dependent variables.

In sum, the issues raised by Lyons and Fitzgerald are obviously worth further consideration and debate. We do not contend that our regression-based technique of controlling for population effects should be universally used in lieu of the ratio measures more commonly employed in cross-sectional analysis. In certain special cases where population is particularly dominant, however, it seems to us an attractive way to remove that confounding effect. No

one quarrels with the view that a comprehensive state-by-state analysis will produce the most precise estimates of the targeting effects of state aid. This approach certainly appears to be the next step in ascertaining whether, for example, Tennessee or Oklahoma more effectively employs state dollars to meet local government needs. *SSQ*

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