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Studies on Determinants of Public Expenditures: A Review

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FUNCTIONAL FEDERALISM:

Grants-in-Aid and PPB Systems

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CONTENTS

APPENDIX

Studies on determinants of public expenditures: a review*

THE SUBSTANTIAL AMOUNTS OF PUBLIC FINANCE DATA which were made available by the U.S. Bureau of the Census, Division of Governments, in the 1957 and 1962 *Census of Governments* stimulated a notable increase in empirical studies on public expenditure determinants. This has become an investigative area of growing importance to all researchers in fields that involve public expenditure. For example, in this present study, reference was made in Chapter 3 to determinants studies as providing an objective test for the capacity of federal matching shares to achieve minimum national standards at lowest federal tax cost. And Chapter 5 emphasized determinants research as a way of predicting relative expenditure requirements as part of an index of emerging pressures on fiscal capacity in the states.

The Census of Governments volumes of 1967 will undoubtedly stimulate further work on determinants. Therefore, we believed it would be useful to compare, contrast, criticize, and, as far as possible, synthesize the results of the statistical analyses already published. Through identification of both the strengths and limitations of their concepts and methodologies, meaningful boundaries may possibly be set for the direction of future research in this area. To this end, we compiled a listing of sixty-six studies; these include both analyses of determinants and discussions of such analyses. Some fifty of the studies were chosen for explicit comment here, but all of those on the list were part of the background of our review.* *

* * The list of sixty-six references will be found at the end of the Appendix, in numbered alphabetical order. The number in parentheses following an author's name in the text of the review refers to that numbered order. The studies not explicitly discussed are so noted in the listing, because we believe that readers will find a full perusal of the listing rewarding for their own purposes.

We cannot, of course, claim that our list covers the complete output of existing studies up to the spring of 1967—the time when this paper was being written. Further, the volume of determinants literature has been increasing steadily since that date, and, for various reasons, it has been possible to include only a very few of the most recent contributions here.

WHY DETERMINANTS STUDIES?

One could venture several explanations (including the work noted above of the Governments Division of the U.S. Bureau of the Census) for the proliferation of determinants studies in recent years. The major explanation lies in the lack of a general theory to explain the pattern of expenditure variation among governmental units. Accordingly, research has been stimulated on the decision making process of such units and on forecasting their needs. What the research studies are designed to do is to assist governments in estimating expenditures for periods ahead and to improve our understanding of the complex of forces and their interactions that determine how much a jurisdiction spends relative to others. The existence of large amounts of comparable published fiscal data for state and local governments has encouraged this particular approach. In addition to the 1957 and 1962 *Census of Governments* volumes, certain expenditure data are available on an annual basis in *Governmental Finances, Compendium of City Government Finances,* and *Compendium of State Government Finances.* Also, many states collect and make available extensive data on the expenditures and revenues of local units.

A third reason for the rash of determinants studies is the appeal and simplicity of the regression technique. Given the availability of a variety of suitable computer packages, a multiple regression analysis is easily carried out, and it gives the illusion of being a sophisticated quantitative technique. However, failure to take account of certain of the difficulties inherent in this statistical method has led in several cases to misleading, if not erroneous, interpretations of results.

STATISTICAL TECHNIQUES USED

The technique most often used in the studies is the cross-sectional multivariable regression. However, a difficulty with the analysis of cross-sectional data is that it enables only a static interpretation (e.g., that *differences* in per capita expenditures among governmental units are associated with *differences* in independent variables *at a single point in time*), although the objective may be to make a dynamic inference (*e.g.,* that the *change* in per capita expenditures of a governmental unit is associated with a *change* over time in the population of that unit).

To go beyond the static interpretation of cross-sectional results, Sacks-Harris (55) and Bahl-Saunders (8) have examined the stability and the size of standardized regression coefficients computed from cross-sectional analyses for different years in order to describe temporal changes in the relative importance of the independent variables. To the extent that the intercorrelations among the independent variables changed between points in time this method of estimating changes in the relative importance of the determinants does not yield accurate results.

A second method that has been used to examine the temporal dimensions of the determinants is to regress *differences* of selected independent variables on *differences* of per capita government expenditures; see Bahl and Saunders (7) and Kee (42). This approach enables description of changes in the pattern of variation among government units of per capita expenditure increments, but it falls short of describing the temporal covariability between per person spending and selected independent variables for a particular unit of analysis. That is to say, the response of per capita expenditures of some unit of government to a change in certain institutional or economic factors may not be satisfactorily explained by a cross-sectional analysis.

In a more recent study—Fredland, Hymans, and Morss (25)—both cross-

section and time series data have been used to identify factors affecting the short-run expenditure decisions made by state governments. The authors first ran time series regressions on individual states and then performed a covariance analysis employing pooled data across states, and over time.

Wood (66) uses a factor analysis in examining the questions: (1) in what relevant respects do communities within a metropolitan area differ? and (2) how are expenditure patterns related to these community differences? He concludes that factor analysis is preferable to regression because the former takes into account underlying structural characteristics rather than just the measurable characteristics, or proxy variables.

In actuality the choice of a statistical technique in these studies is primarily determined by the nature of the available data; in theory, however, the cross-section and the time series analyses are not designed to answer the same kinds of questions. The cross-section regression gives a picture of the aggregate pattern, or structure, of public spending, while the time series analysis enables a measurement of the trend in public spending for an individual unit and a description of fluctuations about this trend. Accordingly, the time series approach gives little information about structure at a point in time, and the cross-section approach gives little information about temporal covariability between per capita expenditures and the explanatory factors.

Those who are dissatisfied with the regression model because it involves using proxy variables for the true underlying structural differences (or changes), or because of difficulties in identifying the separate effects of explanatory variables, have the option of turning to multivariate techniques such as factor analysis and principal components analysis, both of which are concerned with the examination of interdependencies. In any case, the high degree of correlation among independent variables used in these analyses makes a thorough examination of interdependencies a necessary prerequisite to the regression analysis.

LIMITATIONS OF DETERMINANTS STUDIES

The factors that have resulted in the popularity of determinants studies have also resulted in some of the more serious limitations of this approach. Incomparabilities and inadequacies in the data and shortcomings in the regression technique are two serious problems encountered in interpreting the results of those analyses. In addition to methodological limitations, many of the studies have been plagued by one or more of three conceptual problems: circularity in the statistical model, a blurring of the concepts of cost and expenditures, and confusion in use of the concept of economies of scale. These problems are examined in the following sections.

METHODOLOGICAL

The regression technique enables the partitioning of the total variation in the dependent variable into two components: (1) a systematic variation associated with variations in the independent variables and (2) an error term. However, investigators have attempted to measure the separate effect of the independent variables by using statistical measures such as partial correlation, beta, or elasticity coefficients. Each of these measures assumes all explanatory variables to be held constant except the one in question and then purports to discover the "sensitivity" of the dependent variable to a small change (or in the case of a cross-section, difference) in the independent variable. However, if the

independent variables are intercorrelated, i.e., if they are not truly independent, the *ceteris paribus* assumption cannot be met. This problem of statistical confluence or multicollinearity renders any measures of the partial effects of the independent variables suspect.

Frisch (26) found that when there is substantial correlation among the explanatory variables, there is a tendency for the standard errors of the estimated parameters to become large. The fact that confluence is manifested by large standard errors of the parameters indicates the dangers in inferring that only variables with significant regression coefficients are important. A regression coefficient may well be nonsignificant because it contributes little to explained variation, i.e., because the explanatory factor is unrelated to the dependent variable. However, a regression coefficient may also be statistically nonsignificant if it is closely related to another of the explanatory variables, even if it is an important "explainer" of variation in the dependent variable.

Other methodological problems relate to the data that have been used. First, there are serious problems of comparability of expenditure data among governmental units. For example, in analyzing a national cross-section of municipal expenditures, one must take account of state-to-state differences in the nature of functional responsibilities; otherwise inferences may be drawn concerning expenditures *in the city area* when data relate only to expenditures *by the city* government. These difficulties are compounded as the nature and magnitude of the incomparabilities in the data change through time. For these reasons, most serious analyses of municipal expenditure patterns have focused on individual functional categories, or a grouping of expenditure functions common to all the cities in a given sample. A second data limitation is the lack of adequate time series data, a lack which negates the possibility of more extensive statistical examination of the dynamics of the public expenditure decision.

CIRCULARITY

In one sense, the inclusion of federal aid as an explanatory variable for per capita state and local government expenditures combined introduces an element of circularity since total expenditures are equal to the sum of expenditures from own sources and expenditures from intergovernmental sources. Hence, it is not surprising that if all other things are held constant, higher levels of grants are associated with higher levels of expenditures. Empirically, there would appear to be two ways of adjusting for circularity. First, one might subtract per capita intergovernmental aids from per capita total expenditures, thereby expressing the dependent variables as per capita expenditures from own sources. This does not completely eliminate the circularity problem since, for example, some federal grants carry matching requirements and therefore cause expenditures from own sources to be greater. A second approach is to omit per capita federal (or state) grants as an independent variable. However, it is important to note that this does not completely eliminate the effects of intergovernmental aids on the level of per capita expenditures because of the intercorrelation between intergovernmental aids and the explanatory variables. For example, if the variable, "percentage of families with income under $3,000," is found to be an important determinant of interstate variations in per capita public assistance payments, the effects of state aids may still be present since states with greater proportions of low income families receive greater per capita public welfare aids.

A similar problem in some determinants studies relates to the use of per capita assessed value, which is often cited as a statistically significant explanatory variable. This significance is not unexpected since higher per capita assessed

value may mean higher per capita property tax revenues—which may in turn lead to higher per capita total revenue, and consequently, higher per capita expenditures. But the conclusion that revenues are a significant determinant of expenditures is of little use in constructing a positive theory of public spending.

Another way in which circularity has been introduced into these studies is by explaining variations in expenditures for a given function using the cost of inputs as an independent variable. A hypothetical example of this conceptual error would be the use of "number of policemen" and "average police officer salary" as explanatory variables. A less hypothetical example is the use of "average teacher salary" as an explainer of variations in education spending.

COST AND EXPENDITURES

A second conceptual problem relates to the use of the terms "cost" and "expenditures." Some studies purport to explain variations in the former, some in the latter, and some use the terms synonymously. One could conceptualize the total variance in per capita expenditures (σ_e^2) as having a quality component (σ_q^2) and a cost component (σ_c^2) such that

$$\sigma_e^2 = \sigma_c^2 + \sigma_q^2. \tag{1}$$

If the objective is to explain variations in per capita expenditures, a stochastic model such as

$$E = f(x_1, x_2, \ldots, x_n, u) \tag{2}$$

could be used where E is per capita expenditures, the x_i are independent variables which are proxy measures for the determinants of differentials in cost *and* quality, and u is an error term. On the other hand, if the objective is to explain the variance in *costs,* which is clearly equal to

$$\sigma_c^2 = \sigma_e^2 - \sigma_q^2, \tag{3}$$

the dependent variable in the stochastic model must be $C = (E-Q)$. Hence

$$(E-Q) = f(x_1, x_2, \ldots, x_n, u), \tag{4}$$

and the independent variables are not assumed to reflect quality differences. The third case mentioned, cost and expenditures treated as being equal, $\sigma_e^2 = \sigma_c^2$, clearly assumes $\sigma_q^2 = 0$.

Since a satisfactory method of eliminating the quality component from expenditures has not been developed, the alternatives in handling the problem are to assume (1) that there is no quality difference among the units of government being analyzed; or (2) that "independent" variables reflecting only quality differentials can be included among the explanatory variables in the equation thereby netting out the effects of quality; or (c) that the independent variables account for both cost *and* quality differentials and the objective is to explain per capita expenditure variations.

The first alternative (to assume that various governmental units offer the same quality of service) is unrealistic. The second could be implemented only if one could identify independent variables that both reflect quality differentials and are not highly correlated with other explanatory variables. Hirsch (35) has attempted to include quality as an independent variable to explain per capita education expenditure variations among twenty nine St. Louis county school

districts. However, his index of quality is "average teacher salary"; consequently the significance of this index as a determinant of expenditures may be due only to the effect of average teacher salary as a cost of operation.

Schmandt and Stephens (58) in examining the relationship between per capita expenditures, population, and service level for nineteen cities and villages in Milwaukee County, construct a measure of quality based on output rather than input. Their measure is derived from a breakdown of each municipal service into subfunctions. For example, police protection is broken down into sixty five categories, including foot and motorcycle patrols, criminal investigation, youth aid bureau, school crossing guards, pulmotor service, and so forth. "The service index or level for each function is then determined by adding the number of activities performed by the municipality." A total of 550 municipal subfunctions are used. Analysis of rank correlation coefficients shows that governmental units having larger populations supply residents with significantly more subfunctions of services ($r = .80$), but that no relationship exists between service level and per capita expenditures ($r = .07$).

Though an output measure such as "number of subfunctions performed" is probably a better index of quality than an input factor such as "average teacher salary," it is not suitable for use as an independent variable in the multiple regression analysis. First, even if two municipalities provide the same number of subfunctions, it does not necessarily follow that the scope or quality of performance in the two municipalities is the same. For example, two equal-size municipalities may provide summer recreational programs for youths, but on vastly different scales. A more important restriction on using this measure of service level as an independent variable in the regression equation is the degree of intercorrelation with other explanatory factors. The purpose of including a quality variable is to examine the covariability between per capita expenditures and some explanatory factor while holding constant the effects of quality; but if this measure of quality is collinear with the other independent variables, any measure of separate effect will be biased.

Having ruled out the possibility of including quality as an independent variable, one is left with the alternative of assuming that the independent variables reflect the factors of cost, quality, and ability to pay. To illustrate the problems of interpretation created by this assumption: if per capita income is found to be significantly and positively related to per capita police expenditures, it could be argued that persons with higher incomes require greater levels of police protection, or that higher-income families demand a higher quality police force, or that higher-income levels reflect a greater capacity to finance police services. It is this kind of problem which makes a thorough interdependency analysis an imperative prerequisite to any regression analysis.

ECONOMIES OF SCALE

A third point of confusion in determinants studies relates to attempts to make use of the microeconomic concept of (internal) economies of scale to explain the slope of the long-run average cost curve in the provision of a public service. Theoretically, economies of scale (declining per unit costs) exist because the expansion of the firm enables management to combine productive factors in such a way that average productivity increases. It also seems feasible that as the size (population) of the governmental unit served expands, per unit costs might be lowered. However, most empirical examinations of this question have proceeded without consideration of the nature of the underlying production functions for public services; but see Hirsch (39). If a significant negative relationship is observed between per capita expenditures for a service and popu-

lation, it is usually argued that there might be economies of scale in the financing of that service. This line of reasoning ignores the fact that differentials in expenditures may reflect differentials in quality as well as in cost. Secondly, when this analogy to the economies of scale concept is carried to its logical extreme, it seems to be based on the assumption that population of a governmental unit is a measure of output. Consequently a negative relationship between per capita expenditures and population size gives very little information about the existence or non-existence of economies of scale, *i.e.,* about the nature of the underlying production function. Moreover, the statistical analyses have been made on cross-sections of data, therefore, any conclusions reached must be based on the finding that at a point in time larger government units in the sample spend significantly less per capita than smaller government units. It does not necessarily follow that an increase in the population of any given governmental unit will be accompanied by a decline in per capita costs.

One further conceptual difficulty with using an economy of scale analogy in the public sector concerns the confusion between movements along the long-run average cost curve and shifts to lower long-run average cost curves. Cross-section studies may suggest shifts, since the arguments for governmental consolidation, particularly within standard metropolitan statistical areas, are based on the theory that a lower-cost combination of inputs will result from consolidation if the same size population will be served. However, the concept of economies of scale as developed in the theory of the firm assumes a least cost combination of inputs for any given level of output and relates to movements along this particular long-run average cost curve.

THE DETERMINANTS STUDIES*

This section is a brief survey of the determinants literature, organized around the unit of government considered, and including most of the major contributions. The objective here is to describe, synthesize (if possible), and evaluate what has been done.

STATE AND LOCAL STUDIES

Although Colm (17) and Berolzheimer (12) statistically investigated the determinants of state and local government expenditures in earlier works, Fabricant's analysis (21) of 1941 data was the first comprehensive attempt (in a geographic sense) to explain the pattern of such government expenditures. Consequently, Fabricant is usually given the credit, or blame, for starting the rash of determinants studies. His unit of analysis is per capita state and local government expenditures, and therefore the problem of interstate differences in the division of state-local financial responsibility is avoided. But aggregating expenditures in this manner does not result in analysis that explains the factors affecting the decisions of individual governmental units. In explaining approximately 72 percent of the variation in per capita operating expenditures, and 28 to 85 percent for other functions, he concludes that interstate differences in income are primarily responsible for state-to-state spending differentials. Fabri-

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* Robin Barlow has compiled an extensive tabular summary of the statistical results of determinants studies: "Multivariate Studies of the Determinants of State and Local Government Expenditures," paper prepared for the Ford Foundation Workshop in State Local Finance, Ann Arbor, Michigan, June 1966.

cant's three "basic variables" are income, population density, and urbanization, of which he finds urbanization to be the least important explanatory factor.

Fisher (22, 23) extended Fabricant's analysis on 1957 data to consider a number of additional economic, demographic, and socio-political variables and found that interstate spending disparities are closely associated with the distribution of income within states. However, Fisher recognizes that the strong negative correlation between the percentage of families with income less than $3,000 and per capita expenditures may be attributable to either (1) greater political resistance among low income groups to increased government expenditures and to higher taxes, or (2) the high correlation between income level and income distribution.

Sacks and Harris (55) test the hypothesis that the level of government expenditures is not independent of the source of the revenues, and find differentials in per capita federal and state aid to be closely associated with expenditure disparities. In contrasting the results of their 1957 and 1960 regressions with Fabricant's 1942 analysis, they conclude that the substantial decline in the explanatory power of the three basic variables is a result of the increasing importance of intergovernmental flows of funds. However, Bahl and Saunders more recent paper (9) shows that the marginal contribution of federal aid between 1942 and 1962 was approximately the same; hence the explanation—the declining importance of the three basic variables—is not supported by the data. It is hypothesized that the reduction in the explanatory power of Fabricant's basic factors is due to the increasing complexities of public expenditure decisions, i.e., the level of public spending has become increasingly responsive to particular needs.

Spangler (63) has found a significant and positive correlation coefficient between linear rate of population growth between 1950 and 1960 and per capita expenditures for education, health and hospitals, police, interest expense, general control, and capital outlays. He contends that the most efficient rate of output may well be the present one—the one to which the workers are accustomed—and that the disruptive effects of expansion result in rising per capita expenditures. However, his suggestion that there exists a rising long-run average cost curve for state and local government is not supported by empirical analyses for other levels of government; e.g., Brazer (15) found a negative relationship between per capita city expenditures and rate of population growth. Therefore it may be hypothesized that Spangler's interpretation was distorted by collinearities in the data,* or by inadequacies in the technique, or alternatively, that the reasons for the observed diseconomies are to be found at the state rather than the local level.

One final contribution deserves mention: it is Kurnow's argument (43) that the additive, or linear, regression model is not appropriate and should be replaced by a model that accounts for joint effects. Whereas a model of the form

$$y_i = a + (\Sigma\, b_i x_i) + u$$

may result in explaining the effect of x_i on y given that n-1 remaining variables are held constant, a multiplicative form such as

$$y = a x_1^{b1}\, x_2^{b2} \ldots x_n^{bn}\, u$$

enables a measurement of the effect on x_i on y given the *level* of n-1 other

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* For example, interstate differences in per capita income in 1962 and rate of population growth between 1950 and 1960 are significantly correlated (r=.54); see Bahl and Saunders (9).

independent variables. Kurnow's point is conceded if one grants the assumption, for example, that the effect of income on expenditures is not independent of the *level* of population density. He has tested this thesis with apparently satisfactory results, increasing the determination coefficient from .72 to .88 on 1942 data and from .53 to .78 on 1957 data.

In summary, it may be concluded that interstate disparities in the level and distribution of income and in the level of per capita intergovernmental revenues account for most of the interstate variability in per capita state and local government expenditures. Again, the appropriateness of using a source of funds such as federal aid as an explanatory factor must be questioned on both conceptual and methodological grounds. More will be said about this later.

CITY EXPENDITURES

To date, Brazer's analysis (15) of the pattern of municipal expenditures in 1951 has been the definitive empirical work on city government spending. In analyzing spending by 462 cities of over 25,000 population he was able to explain approximately 60 percent of the among-city variability in per capita operating expenditures and 6 to 27 percent for various functional categories. He found that the association between population size and per capita expenditures was significant only with respect to police protection, while population density was significantly associated with most expenditure categories. He observed "economies of density" (a significant negative regression coefficient) only for the functions of police protection and street maintenance and found rate of population growth to be a minor factor in determining the level of municipal expenditures. Median family income was significant for all expenditure classes except per capita operating expenses, while per capita intergovernmental revenue was significant in every case. Brazer concludes that the determinants of the level of city expenditures are neither few in number nor readily identifiable, and he points to factors peculiar to state of location as major determinants.

Hawley (32) had earlier regressed a number of socioeconomic and demographic variables on the 1940 per capita expenditures of 76 central cities with metropolitan area populations of 100,000 or more. He found, as did Brazer, no statistical evidence of economies or diseconomies of scale, and he concluded that expenditures by the central city are more closely related to urban fringe population than to central city population. While the possible implications of Hawley's finding must be tempered by recognition of the existing multicollinearity and incomparabilities in the data, the finding demonstrates clearly that an appropriate fiscal and physical planning unit for the central city must include the entire metropolitan area.

A number of additional similarities in the results regarding per capita current expenditures in the above two studies are worth noting. The magnitudes of explained variations are extremely close—57 percent for Brazer and 59 percent for Hawley. Both found evidence of economies of population density and an inverse relation with population growth rate, and both reached the conclusion that the level of central city expenditures is more closely associated with metropolitan area population than with central city population.

Bahl (6) has updated the Brazer-Hawley type of analysis by statistically investigating the pattern of public expenditures among 198 central cities of metropolitan areas. Data were analyzed cross sectionally for 1950 and 1960, and for the changes in per capita expenditures between 1950 and 1960. The conclusions were, in general, quite similar to those reached in the earlier studies: the level of per capita central city expenditures is closely related to the size of the central city population, *relative* to that of the entire Standard Metropolitan

Statistical Area; spending for some functions (notably for police and fire protection, and highways) shows a close association with population density and much of the intercity variation can be attributed to variations in intergovernmental revenues. However, the analysis of expenditure changes and the comparison of 1960 and 1950 results indicates a possible change in the structure of expenditure determinants; i.e., the same factors account for considerably more of the intercity variation for a given function in the later year. For example, per person police expenditures can be explained to a much greater extent in the later year by factors that could be hypothesized to reflect needs for police, and to a much lesser extent by the level of per capita total expenditures. This finding may suggest that expenditure requirements for certain functions are being viewed much less in terms of a given fraction of the public budget, and much more in terms of changes in the level of needs.

Examinations of within-state municipal per capita spending differentials have been carried out in Washington, New Jersey, California, Ohio, and Massachusetts. Brazer (15) investigated the spending patterns of thirty five cities in California, thirty in Massachusetts, and thirty two in Ohio and found that in every case the expenditure variation that could be explained within the states was greater than when cities of various states were considered together. This strongly supports his contention that intermunicipal spending comparisons are distorted substantially when state lines are crossed. Further evidence of the distortion created by interstate comparison is his finding that, while variability in spending among Ohio cities was closely associated with the level of intergovernmental aids, no such significant correlation was observed for cities in Massachusetts, a state in which municipalities are responsible for both the education and the public welfare functions.

Each of four separate analyses of California cities showed that differences in internal fiscal ability and in the level of intergovernmental revenue were the major factors accounting for intercity spending differentials. Brazer (15) found per capita intergovernmental revenues to be highly significant for California cities, while Scott and Feder (59), Shelton, and Davies (64), and Elsner and Sosnick (20), found per capita assessed valuation to be a highly significant explanatory factor. Since, in addition to per capita assessed value, each of the latter three studies used as an independent variable some indicator of the yield of sales or use taxes, the models are subject to the circularity error, i.e., their findings may show only that expenditures are higher because revenues are higher.

The statistical results of these intrastate studies would seem to indicate that the relationship between per person municipal spending and demographic factors is dependent on state of location and perhaps on the year considered. While Brazer found among-city expenditure variations in Ohio and in Massachusetts to be significantly and positively associated with population size, neither Brazer nor Scott and Feder observed significant economies or diseconomies of size for California cities. Conversely, both Shelton-Davies and Elsner-Sosnick found significant diseconomies among California cities in a later period.

In the analyses carried out on California cities by Brazer, Scott-Feder, and Elsner-Sosnick, rate of population growth was found to be a significant determinant of expenditure level and in each study the relation was found to be inverse. Since no similar significant partial relationship is observed for cities in Ohio, Massachusetts, or (48) Washington, it might tentatively be concluded that rate of population growth exerts a significant influence on the level of public spending *only in the more rapidly growing cities*. Arithmetically, the inverse expenditure-growth rate relationship may be explained by a spreading effect,

i.e., the fact that in rapidly growing municipalities the denominator of the per capita expenditure figure has increased much faster than has the numerator, which may well mean a decline in the quality and/or scope of services.

INTER AND INTRA METROPOLITAN STUDIES

The value of an analysis of spending differentials among metropolitan areas is that it abstracts from the problem of *intra*-local differences in the distribution of functional responsibilities. Brazer (15) combined 1953 expenditures of overlapping governments within the forty largest central cities, thereby effecting an analysis of the determinants of expenditures *in the city area* by all local governments as opposed to expenditures *by the city government*. While he found neither population size nor rate of growth to be statistically significant, he did find the ratio of city population to metropolitan area population to be a significant explainer of expenditure variations. This reinforces Hawley's contention (32) that central city spending is strongly influenced by the characteristics of the population of the urban fringe. In addition, Brazer found per capita intergovernmental revenues to be a major force in determining expenditure levels, but he also found that differences in the level of income exerted a much smaller influence on the level of aggregate expenditures in large cities than on expenditures of 462 cities with population in excess of 25,000.

Kee (42) analyzed 1957 per person expenditures of thirty six central cities and overlapping units of governments in what is essentially a replication of the Brazer analysis for a later year. The results of his study parallel Brazer's in that differences in income, intergovernmental revenues, and the distribution of population within the Standard Metropolitan Statistical Area are significantly associated with intermetropolitan differences in per capita expenditures. Further, a comparison of his net regression and multiple correlation coefficients for 1957 data with Brazer's for 1951 suggests a fairly high degree of stability between the two years in the relative importance of the explanatory factors.

Prescott (52) found variations in income level and variations in the level of per capita federal and state aids explained most of the variations in per capita expenditures among Standard Metropolitan Statistical Areas in a twelve-state midwestern region. He found population density, growth rate, and property valuation to be generally nonsignificant.

Several intensive studies of the public finances of specific metropolitan areas have included multiple regression analyses of per capita expenditures of governmental units within the standard metropolitan statistical area. The advantages of intrametropolitan analysis are primarily (1) that certain environmental factors may be held constant by examining data for only a single SMSA, (2) that disparities in the quality of service might be smaller within a given metropolitan area than among metropolitan areas, and (3) that the division of fiscal responsibility between the state and local governments may be held constant.

Bollens' analysis (14) of 1954-55 data on expenditures by eighty seven governmental units within the St. Louis SMSA revealed that the level of per capita expenditures was significantly affected by the level of assessed value per capita, and by some index of the quality of services. The statistical results did not reveal the existence of any major economies or diseconomies of scale.

Hirsch (36, 37) has approached the problem of economies of size on an intrametropolitan basis by comparing the governmental unit to the firm and thus developing a clever theoretical framework in which to answer the question: "What are the likely expenditure effects of metropolitan growth and consolidation?" He assumes that the partial relationship between per capita expenditures for various functions and some measure of population will approximate the

LRAC curve of the firm; or in terms of his cross-sectional analysis of 149 St. Louis government units, that a movement along the static per capita expenditure-population function could approximate the effects of consolidation of local governments. Hirsch views this consolidation as differing among functions and taking the form of horizontal integration (for education, for fire, police, and refuse collection services), vertical integration (for water and sewer services), or circular integration (for general control). The results of his regression analysis may be summarized as follows: (1) for the horizontally integrated functions, he found that growth and consolidation had little if any significant effects on per capita expenditures; (2) for circularly integrated services he found evidence of a "U" shape long-run average cost curve; (3) for vertically integrated functions he found that per capita expenditures declined with population size. However, since the horizontally integrated functions account for approximately 80-85 percent of all expenditures, efficiency considerations do not appear to warrant across-the-board consolidation of metropolitan area governments. As was pointed out above, this approach is subject to the dual limitations that (1) quality of service cannot be eliminated from the expenditure side of the equation and (2) the high degree of collinearity present makes the partial relationship between population and expenditures an unreliable measure.

Sacks and Hellmuth (56) investigated the variability of per capita expenditures within the Cleveland metropolitan area in 1956 by separating the governmental units into twenty cities and thirty eight villages. Because of vastly different program responsibilities, little of the variability in per person total spending by cities could be attributed to size of population, per person assessed valuation, or wealth; but when individual functions were analyzed, substantial proportions of the expenditure variability could be explained. Conversely, they found that among villages, where the package of services offered is much more homogeneous, substantial proportions of the variation in per person total spending could be explained. Though collinearity obscures much of the true separate effect of the independent variables, differences in per capita assessed valuation clearly account for a substantial proportion of the differences in among-village spending. As with the cities, no evidence of economies of size was uncovered.

Williams (65) has analyzed 1960 per person expenditures for 225 municipalities (90 suburbs, 41 towns, and 94 townships) in the Philadelphia standard metropolitan statistical area. The results indicate that the suburbs differed in expenditures according to land use pattern and economic role. Industrial and commercial centers have a specialized economic function in the metropolitan area and spend for activities that serve the needs generated by their role. Low density residential suburbs have little need for many services but evidence concern for planning, and high density residential suburbs respond to congestion by developing more services. In all cases, wealth and status generated higher demands. With regard to municipalities, significant correlation between population and expenditures is explained as reflecting other characteristics of the towns such as the degree of economic specialization. This seems a plausible argument since the larger towns are commercial and industrial centers and no doubt provide public services to a large nonresident population (i.e., shoppers, commuters). In addition to the importance of the economic nature and land use pattern of the governmental unit considered, the regression showed the level of per capita spending in residential areas to be closely related to social rank and personal wealth, as measured by the value of the home.

In the Schmandt-Stephens (58) study of nineteen Milwaukee County municipalities, it was found that the level of per capita expenditures was unre-

lated to the level of public services (number of subfunctions) or to population. However, the level of public services was significantly and positively related to population, a finding that the authors suggest implies the existence of economies of scale. That is to say, if a greater population can be provided a greater number of services than can a smaller population, but at the same per unit cost, some economies of scale exist.

OTHER LEVELS OF GOVERNMENT ANALYZED

Vieg, *et. al.* (64), regressed selected independent variables on 1957 per capita expenditures of county governments in California. The authors were able to explain 63 percent of the variation, and found per capita assessed value, percentage of county population residing outside incorporated areas, and per capita taxable sales to be significant. Because of the importance of the property tax as a source of revenue for California county governments, per capita assessed value reflects capacity to finance services and therefore enables one to conclude that the level of per capita county government spending is partially determined by the size of the property tax base. The significant positive association between per capita county government expenditures and percentage of county population living in unincorporated areas may mean that county residents living outside cities provide the greatest drain on county government services.

An intercounty analysis of per capita expenditures made *in* counties by all governments enables a better evaluation of the extent to which socio-economic factors determine service levels. Adams (2, 4) treats per capita expenditures by all local governments in each of 478 county areas as a dependent variable. To avoid problems arising from interstate differences in the division of state-local fiscal responsibility, he excludes from the analysis functions characterized by high levels of intergovernmental assistance (welfare, highways, education). He uses as independent factors variables reflecting intercounty differences in socioeconomic environment, in physical environment, in income and wealth, in individual characteristics (e.g., percent nonwhite), and political or institutional characteristics. The partial correlation coefficients obtained show variables reflecting differences in socioeconomic environment were the primary determinants of the level of per capita police, fire, sanitation, sewage disposal, and recreation expenditures, while the income variable was found to be relatively unimportant. Adams' findings also show per capita expenditures to be significantly lower in counties experiencing large amounts of in-migration, a result that suggests that the public sector undervalues the preferences and tastes for public services of newcomers. Alternative explanations of this result are that local governments allow quality of services to drop by not expanding public programs to meet the needs of larger populations, or that the relationship between population growth, and increments in the level of public expenditures, is a lagged one.

Schmandt and Stephens (57) examined per capita expenditures by local governments in county areas. Their study included 3,096 counties; the relationship between per capita expenditures and selected economic and demographic variables were analyzed with a simple correlation technique. The results showed that variations in state aids explained most of the variability in per capita expenditures for the aided functions (welfare, highways, and public education) and that family income level explained most of the variance in the traditionally locally financed functions (police and fire). However, the Schmandt-Stephens analysis suffers from the serious weakness of data incomparability to the extent that the distribution of state-local fiscal responsibility differs among states in the sample.

A more recent expenditure analysis by Bahl and Saunders (10) focuses on the pattern of public expenditures within an underdeveloped state—West Virginia—and also uses county area expenditures as the dependent variable. However, in addition to county aggregate expenditures from all local sources, expenditures by all local governments within West Virginia county areas are examined. The results indicate that the level of per capita total public expenditures in counties bore little if any relation to the level of wealth and in fact, was negatively correlated with per capita income level. Over 75 percent of the intercounty variation in per person expenditures was attributable to intercounty variations in per capita state and federal aids and in direct expenditures. Expenditures from local sources were found to be positively related to income level, but did not vary significantly with other socioeconomic or demographic factors. One could reconcile this conclusion with Adams' finding (4) that socioeconomic environment factors are important determinants while income is not by arguing that income is a representative proxy of environmental differences among counties in West Virginia.

Adams has also (3) investigated the activities of the public sector in Appalachia by regressing per capita state and federal aids on local fiscal effort (general revenue less intergovernmental transfers) for county areas. The sample was composed of 1,249 low income counties (a prerequisite for inclusion was a population density between 15 and 50 per square mile) including 146 of the 354 counties located in the Appalachian region. Local fiscal effort in Appalachia was found to be low relative to that in the rest of the country, and negatively related to state aid, within most Appalachian states. When county areas are analyzed by state, for about half of the states a positive correlation was found between local effort and aid. This suggests that an increase in per capita state aid leads to a more than proportionate increase in local public expenditures, that is, to an increase in the share of personal income going to the public sector.

EXPLAINING VARIATIONS IN SPECIFIC CLASSES OF EXPENDITURES

Most of the studies described in the preceding section involve analysis of per capita total expenditures of the government considered, but many also include separate analyses of individual functional categories of government expenditures. It is this latter form of the dependent variable that has the most to offer by way of identifying the underlying structure of public expenditures. The following is a brief summary and synthesis of the empirical conclusions as to the determinants of the level of spending for the major public programs.

EDUCATION

Most studies of the structure of public expenditures have included a separate analysis of education spending since this function accounts for such a large proportion of the public budget. These statistical analyses have concentrated primarily on measuring the degree of association between per capita or per pupil education spending and income, state aid, and certain needs factors.

There is general agreement that income level exerts a significant and positive effect on the level of spending for education. Hirsch (33) estimates the income elasticity of demand for education as 1.09 for the period 1950-58; McLoone (45) estimates the national average at 1.34 for the period 1947-57; James

(40) estimates the 1946-58 elasticities for Washington, California, New Jersey, Nebraska, and Wisconsin as ranging from a high of 2.2 for Nebraska to a low of 1.49 for New Jersey. Though the actual comparability of these results is limited because of differences in the statistical techniques, or the specification of the model, or the form of the variable used, the common conclusion that income exerts a strong positive influence on the growth in education spending is clear. Further, the results of cross-section regressions on interstate variations in per capita (or per pupil) education expenditures lends weight to the importance of the income effect. Fabricant (21), Fisher (23), and Brazer (15) have found interstate (or, in Brazer, intermetropolitan) income differences and per capita education expenditure differences to be significantly and positively associated. Hirsch's cross-sectional analysis of per pupil current education expenditures by St. Louis County school districts in 1951-52 and 1954-55 reveals that, "a district's financial ability to afford education measured in terms of per pupil assessed valuation of real property, was by far the most important determinant" (35). He states, however, that assessed value and income are highly intercorrelated.

It is interesting to note that cross-section estimates have generally shown the income elasticity of public education expenditures to be less than unity, e.g., Fabricant, 0.78, Brazer, 0.73, and Hirsch, 0.56 (21, 15, 35). However, these statistics do not justify Hirsch's conclusion (for the St. Louis area) that "as income *increases* by 1 percent, expenditures for public education *increase* by merely 0.56 percent. . . . Thus, the income elasticity for public education is distinctly below 1; it is inelastic" (35, P. 37). (Italics added by Bahl.) Hirsch's data were cross-sectional, not time series; consequently his coefficient provides no information about the temporal variability between education expenditures and income. What his elasticity figure does show is that at a given point in time, interdistrict differences in education expenditures are proportionately smaller than the differences in income among these districts.

In a more extensive work, Sherman Shapiro (61) has applied cross-section regression analysis to education expenditure data in each of four years for forty eight states, and separately for southern and nonsouthern states. He finds that per capita personal income was the major explanatory factor of interstate differences (among 48 states) in three of the years considered, and though it was a significant determinant of interstate differences among nonsouthern states, it was not an important explainer of education spending levels of southern states.

Miner (47) has examined the spending pattern of 1,127 school districts in 21 states with a regression model in which the independent variables (he initially considers 26) are specified as demand or supply factors "to reflect the underlying determinants of the quantity, cost, and quality of the education services provided in individual school systems which, in turn, determine levels of expenditures" (P. 74). However, the high degree of intercorrelation among the explanatory factors prevents him from attributing the statistical importance of a variable to a supply or demand effect. Miner concludes that the explanatory power of his model is not strong and attributes this to the possibility that agencies that determine local school expenditures are not motivated by rational economic objectives, and hence do not respond to similar preference patterns in similar fashion. The statistical analysis does show that education spending differences within states were largely a result of differences in factors that reflect the level of state aids, and Miner notes that the effects of factors that reflect local preferences seem to be virtually obliterated. Finally, his conclusions lend some support to the hypothesis that expenditures are lower in dependent school systems, even when ability-to-pay and cost elements are taken into account.

Another question regarding the structure of spending for public education that has been investigated with the regression technique relates to whether state education aids are *stimulative* or *substitutive* for local resources. This is generally approached by regressing per capita (or per pupil) state aids and other independent variables on per capita (or per pupil) education expenditures (including intergovernmental aids). If the regression coefficient exceeds unity, i.e., if a one dollar increment in per capita state aid is accompanied by an increment in per capita education expenditures greater than one dollar, the effect is stimulative. If the regression coefficient is less than one, the effect is substitutive. Brazer (15), in analyzing per capita education spending in 40 large cities, found a coefficient of .29, which implies substitution. Renshaw (53), in examining per pupil data for the forty eight continental states, found a coefficient of .16, which also implies substitutibility, as did Bishop (13) in investigating the effects of state aids on 1,400 New England towns and cities in 1962.

POLICE, FIRE, SANITATION

The results of the determinants analyses are generally consistent in concluding that the level of police, fire, and sanitation-related services is fairly responsive to the physical and economic characteristics of the community. Three hypotheses have been tested about the determinants of expenditures for these functions. First, that the cost of providing these services is related to the physical area that must be served, i.e., all other things being equal, the smaller the land area that must be served, the smaller are per capita expenditures. Second, that service requirements are greater to the extent that larger proportions of the resident population are in lower income brackets, i.e., low income level results in, among other things, higher crime rates and a greater amount of dilapidated housing and consequently greater police and fire expenditures. A third hypothesis is that the government expenditure decision for these functions is sensitive to the demands of both higher income residents and commercial users of the services.

Analyses of the variation in per capita fire expenditures among governmental units has focused on both cost and demand factors. Bollens (14) found that larger land areas resulted in higher expenditures for fire services, Brazer (15) found a positive relationship with population density, Wood (66) with housing density, and Williams (65) with percentage of single family dwelling units. (Williams' variable is also a measure of needs since a lower proportion of single family dwelling units implies a more congested population and a higher proportion of dilapidated housing.) Conversely, Brazer found a positive association of fire services with income; Bollens, with assessed value, and Wood, with the level of industrialization—all implying that the level of fire services provided is also affected by the level of demand generated in the residential and commercial sectors.

Statistical examinations of sanitation, refuse collection, and sewage disposal expenditures have not yielded consistent results primarily because of much incomparability in the data. The governmental responsibility and financing arrangements for this function vary greatly between states and even between communities; hence results obtained from cross-sectional analyses must be viewed with much suspicion. Hirsch (34) has attempted to get at the determinants of "refuse collection cost per pickup" by regressing selected demographic, quality and financial arrangement variables on 1960 data for twenty five St. Louis municipalities. He concludes that quality variables such as collection frequency and pickup location (curb or rear of house) have significant cost effects. Brazer (15), Williams (65), and Bahl (6) have found that per capita sanitation ex-

penditures were positively related to population density, possibly indicating more intensive collection and disposal services required by heavy pedestrian and automobile traffic. Further, refuse collection was more regular and more complete in densely populated areas.

The pattern of expenditures for police protection is similar to that for fire protection in that factors reflecting greater levels of need for law enforcement and traffic control services, and factors that might reflect a demand for greater scope and quality of police services have been consistently identified as significant determinants. Bollens (14) found that the percentage of nonwhites was significant at a positive level, and Brazer and Williams found that population density was a significant, positive determinant. Further, Brazer's results show a significant positive association between per capita police expenditures and the ratio of city employment to city population, while Wood's results (66) show a similar relationship between such expenditures and his index of industrialization. It may be hypothesized that percentage of nonwhites and population density reflect a higher level of requirements for law enforcement because of the low income status of residents of crowded areas and of Negroes, while the role of the city as a center of employment and trade probably results in increased requirements for traffic control functions.

Interstate analyses of the Fabricant type do not enable close examination of the specific factors reflecting needs because of the degree to which the data are aggregated. However, this approach does indicate the extent to which among-state differences in fiscal capacity affect differences in the level of spending for police, fire, and sanitation services. Fabricant (21) found income positively related to interstate differences in police and fire (but not sanitation) expenditures in 1942, however, neither Fisher (23) nor Sacks-Harris (55) found income to exert a significant influence on any of these three types of expenditure in 1960.

HIGHWAYS

Statistical analyses of highway expenditures have taken the form of (1) cross-section regressions of per capita local government expenditures for roads and streets, usually excluding capital expenditures, and (2) regression analyses of interstate differences in per capita expenditures by all levels of government. Interstate statistical examinations of the former type generally may not yield reliable results because of the varying division of state-local responsibility.

For central cities, both Brazer (15) and Bahl (6) have found a significant negative relationship between highway expenditures and population density, which may mean either (1) that higher densities reflect lower ability to pay, which results in lower per capita expenditures on local roads and streets, and/or (2) that higher densities reduce the physical mileage per person that must be maintained and that therefore per resident expenditures are lower. Statistical analyses of interstate variations in aggregated state and local government spending have yielded consistent results in that population density (negatively) and per capita income (positively) are significantly related to the level of highway expenditures. The latter indicates that residents of higher income states both demand and can afford a higher level of highway services, while the former suggests the existence of certain economies in constructing and maintaining highways for densely populated areas (which in many cases are states having relatively small land areas).

Finally, Sacks-Harris (55) and Osman (50) have suggested that forms of intergovernmental assistance are determinants of the level of state and local government highway spending. Osman, in regressing per capita federal aid for high-

ways on per capita highway expenditures from own sources finds a regression coefficient that exceeds unity (1.37) and hence is interpreted as showing a stimulative effect. However, since the regression technique does not enable an accurate measure of the separate effect of federal aids when collinearities in the data exist, and because of the circulatory issue, the conclusion as to the stimulative effects of intergovernmental aids is at best tentative.

PUBLIC WELFARE

Variations in per capita expenditures for public assistance clearly must be associated with variations in need (income level) and with variations in the level of intergovernmental aids for welfare. Fisher (23, 24) is able to explain a significant amount of the interstate variation in recipient rates for aid to dependent children (i.e., number of recipients per 100,000 under 18 years of age) with the independent variables being urban percent of population (positive), percent of labor force unemployed (positive), and percent of families with incomes under $3,000 (positive). He notes that these results are not surprising since high recipient rates for aid to dependent children are associated with urbanization, poverty, and low levels of employment. The results of Fisher's analysis of *average per capita aid to dependent children payments* show that states that make high nonwelfare expenditures also make generally higher aid to dependent children payments per capita, whereas states with large proportions of low income families make lower payments. Wood (66) found that variations in the degree of "low income prevalence" were positively related to the level of variations in public welfare expenditures among New Jersey municipalities.

As might be expected, a significant positive association between per capita federal welfare aid and per capita state and local welfare expenditures has been observed. Osman (50), in an analysis parallel to that on highways described above, found welfare aids to be stimulative (regression coefficient of 1.34) while Kee (42) found empirical evidence that per capita welfare expenditures in metropolitan areas were significantly higher where responsibility for the welfare program lies with the local rather than the state government.

CONCLUSIONS

Determinants analyses reflect in part an attempt to construct a positive theory of public expenditures, i.e., to explain the allocation of resources between the public and the private sector and the allocation of resources among public functions.* The multiple regression analyses described above are efforts to develop this theory by examining, over a large number of either governmental or spatial units, the covariability between expenditures and a wide range of economic, demographic, and sociopolitical factors. Where some factor explains a significant portion of the public expenditure variance, it has been inferred that this factor "reveals" the community's preference for the public good in question. However, limitations in the data and in the statistical technique used are such that empirical studies do not enable an accurate measurement of the factors that affect the government expenditure decision. Moreover, few of the studies appear to be based on a logical theoretical structure. Miner (47) points out that the positive theory aims at explaining actual levels of public spending and therefore must identify each of the major determinants of public spending and

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* For a review and critique of the determinants studies as a method for developing a positive theory, see Siegel (62).

estimate the direction and magnitude of its effect. "Also, if implications of cause and effect rather than associative relationships are to be drawn, a further requisite of a positive theory is that the distinction between dependent and independent variables be based on a logical, theoretical structure that explains the distinction" (Miner, p. 74). A general lack of this kind of theoretical structure has left these studies open to the criticism—for example, from Siegel (62), Fisher (23), and Bahl-Saunders (9)—that the search for explanatory variables is almost casual and that the direction of causation between independent and dependent variables is either unsure or meaningless.

The empirical studies considered in the sections above may be grouped into two general classes: (1) those concerned with explaining spatial differences in the level of public sector activity and (2) those concerned with explaining intergovernmental differences in the level of public sector activity. The first class is weak in that it is overaggregated and consequently provides little information about the factors that affect the expenditure decisions of a particular governmental unit. The alternative—the intergovernment variations approach—is weak as a basis for empirical examination because of broad differences in the division of state-local and interlocal functional responsibility and because of externalities, e.g., the difference between expenditures *in the city* and expenditures *by the city government,* or the difference between the resident population of the city and the population to be served by city government facilities. Both approaches are subject to the limitations created by collinearities in the data, and the lack of an adequate method for isolating quality of service variations.

If this approach to the study of public expenditures is to yield meaningful results, certain refinements and adjustments must be made. First, quantitative measures of the value of urban services must be derived in order to evaluate objectively alternative fiscal development plans and in order to explain intergovernmental or spatial variances in the level of public sector activity; see Ackoff (1). Secondly, the nature of the underlying production function for public goods must be examined before much serious work can be done on the critical question of measuring the cost and efficiency of urban services and before informed judgments can be passed concerning the efficiency argument for governmental consolidation. Thirdly, the question of budget structures needs to be given more attention, i.e., the focus of the empirical works described in the sections above has been largely on the question of variations in the per capita levels of government expenditures, and the reasons for the resulting distribution of funds among alternative functions has been largely ignored.

One method of getting at certain of these unanswered questions is to abandon the macro statistical approach in favor of intensive case studies of specific states, or better yet, metropolitan areas; see, for example, Advisory Commission on Intergovernmental Relations (5) and Committee for Economic Development (18). The advantages of this approach—for example, a case study of a metropolitan area—over the macro approach are numerous: (1) Quality variations within a given metropolitan area are smaller and perhaps may even be measured by factors such as achievement tests of students, crime rates, traffic congestion rates, and so on. (2) Externalities associated with the public sector (such as the urban-suburban exploitation hypothesis) may be examined more intensively and their effects more readily evaluated if the unit of analysis is a particular standard metropolitan statistical area. (3) More accurate and more detailed data for longer periods of time may be collected from local sources. (4) The problems in the data created by differing intergovernmental fiscal arrangements may be eliminated by confining the analysis to a particular standard metropolitan statistical area.

Finally, many of the determinants studies purport to offer conclusions that are of some utility in evaluating alternative public policies. Most often mentioned in this connection are the effects of intergovernmental aids on the magnitude of public spending by lower level governments. But while these studies describe what exists—e.g., the degree to which the existing grant distribution equalizes—they may not be used validly to predict the effects of additional federal aids on state and local spending. The response of state and local governments to more federal aid depends on some combination of the nature of the grant (conditional, unconditional, tax credit, matching, etc.), the relative preferences of residents for certain types of public goods, the preferences of residents for public as against private goods, and the existing levels of public services, fiscal capacity, and fiscal effort. Until these kinds of factors can be properly included in the statistical model, the implications of the results of these analyses for public policy will be extremely limited.

LIST OF REFERENCES*

1. Ackoff, Russell, "Toward a Quantitative Evaluation of Urban Services," in *Public Expenditure Decisions in the Urban Community*, Howard Schaller, editor (Resources for the Future, 1963), pp. 91-117.

2. Adams, Robert F., "Determinants of Local Government Expenditures" (unpublished doctoral dissertation, University of Michigan, 1963).

3. —————————, "Local Fiscal Effort and Intergovernmental Transfers in the Less Developed Areas of the United States," *Review of Economics and Statistics*, Vol. 48 (August 1966) pp. 308-13.

4. —————————, "On the Variation in the Consumption of Public Services," *Review of Economics and Statistics*, Vol. 47 (November 1965), pp. 400-05.

5. Advisory Commission on Intergovernmental Relations, *Fiscal Balance in the American Federal System: Vol. 2, Metropolitan Fiscal Disparities* (Government Printing Office, October 1967).

6. Bahl, Roy W., *Metropolitan City Expenditures: A Comparative Analysis* (University of Kentucky Press, 1968).

7. Bahl, Roy W. and Saunders, Robert J., "Determinants of Changes in State and Local Government Expenditures," *National Tax Journal*, Vol. 18 (March 1965), pp. 50-57.

8. —————————, "Fabricant's Determinants After Twenty Years: A Critical Reappraisal," *American Economist*, Vol. 10 (Spring 1966), pp. 27-42.

9. —————————, "Factors Associated with Variations in State and Local Government Spending," *Journal of Finance*, Vol. 21 (September 1966), pp. 523-34.

10. —————————, *Intercounty Differences in West Virginia Government Spending* (Office of Research and Development, West Virginia University, 1967).

11. Beck, Morris, "Determinants of the Property Tax Level: A Case Study of Northeastern New Jersey," *National Tax Journal*, Vol. 18 (March 1965), pp. 74-77. (N)

12. Beroltzheimer, Josef, "Influences Shaping Expenditure for Operation of State and Local Governments," *Bulletin of the National Tax Association*, Vol. 32 (March, April, May 1947), pp. 170-71, 213-19, 237-44.

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* The letter N following a citation indicates "No explicit comment," but that the study was part of the background of our review.

13. Bishop, George A., "Stimulative Versus Substitutive Effects of State School Aid in New England," *National Tax Journal,* Vol. 17 (June 1964), pp. 133-43.

14. Bollens, J., *et al., Exploring the Metropolitan Community* (University of California Press, 1961).

15. Brazer, Harvey E., *City Expenditures in the United States* (National Bureau of Economic Research, 1959), p. 25.

16. Carroll, John J. and Sacks, Seymour, "Government Expenditures: The Influence of Industry," *Regional Science Association Papers,* Vol. 9 (1962), pp. 173-91. (N)

17. Colm, Gerhard, *et., al.,* "Public Expenditures and Economic Structure in United States," *Social Research,* Vol. 3 (March 1935), pp. 75-85.

18. Committee for Economic Development, *Fiscal Issues in the Future of Federalism* (Supplementary Paper, No. 23, May 1968).

19. Davis, Otto A., "Empirical Evidence of Political Influences upon the Expenditure Policies of Public Schools," in Julius Margolis (ed.), *The Public Economy of Urban Communities* (Resources for the Future, 1965), pp. 92-111. (N)

20. Elsner, Gary H. and Sosnick, Stephen H., *Municipal Expenditures in California: Statistical Correlates* (Occasional Paper Series, No. 2, Institute of Governmental Affairs, Davis Campus, University of California, 1964).

21. Fabricant, Solomon, *The Trend of Government Activity in the United States Since 1900* (National Bureau of Economic Research, 1952), Chapter 6.

22. Fisher, Glenn W., "Determinants of State and Local Government Expenditures: A Preliminary Analysis," *National Tax Journal,* Vol. 14 (December 1961) pp. 349-55.

23. ————————————, "Interstate Variation in State and Local Government Expenditures," *National Tax Journal,* Vol. 17 (March 1964), pp. 55-74.

24. ————————————, "Public Assistance Expenditures," in *Report of the Commission on Revenue of the State of Illinois* (Springfield, 1963), p. 120.

25. Fredland, J. Eric, Hymans, Saul and Morss, Elliott R., "Fluctuations in State Expenditures: An Econometric Analysis," *Southern Economic Journal,* Vol. 33 (April 1967), pp. 496-517.

26. Frisch, R. and Budgett, B.D., "Statistical Correlation and the Theory of Cluster Types," *Journal of the American Statistical Association,* Vol. 26 (June 1931), p. 275.

27. Gensemer, Bruce L., "Determinants of the Fiscal Policy Decisions of Local Governments in Urban Areas: Public Safety and Public Education" (unpublished doctoral dissertation, University of Michigan, 1966). (N)

28. Gregory, Karl D., "Variations in State and Local Appropriations for Publicly Supported Institutions of Higher Education, by State in 1955-66" (unpublished doctoral dissertation, University of Michigan, 1961). (N)

29. Hansen, Nels, "Economy of Scale as a Cost Factor in Financing Public Schools," *National Tax Journal,* Vol. 17 (March 1964), pp. 92-96. (N)

30. Hansen, Niles, "Municipal Investment Requirements in a Growing Agglomeration," *Land Economics,* Vol. 41 (February 1965), pp. 49-56. (N)

31. ————————————, "The Structure and Determinants of Local Public Investment Expenditures," *Review of Economics and Statistics,* Vol. 47 (May 1965), pp. 150-62. (N)

32. Hawley, Amos H., "Metropolitan Population and Municipal Government Expenditures in Central Cities," reprinted in *Cities and Society,* Paul K. Hatt and Albert J. Reiss, Jr. editors (Free Press, revised 1957), pp. 773-82

33. Hirsch, Werner, *Analysis of the Rising Costs of Public Education*, U.S. Congress, Joint Economic Committee, Study Paper, No. 4 (Government Printing Office, November 1959).

34. —————————, "Cost Functions of an Urban Government Service," *Review of Economics and Statistics,* Vol. 47 (February 1965), pp. 87-92.

35. —————————, "Determinants of Public Education Expenditures." *National Tax Journal,* Vol. 13 (March 1960), pp. 29-40.

36. —————————, "Expenditure Implications of Metropolitan Growth and Consolidation," *Review of Economics and Statistics,* Vol. 41 (August 1959), pp. 232-41.

37. —————————, "Expenditure Implications of Metropolitan Consolidation Revisited," *Review of Economics and Statistics,* Vol. 44 (August 1962), pp. 344-46.

38. —————————, "Quality of Government Services," in *Public Expenditures in the Urban Community,* Howard J. Schaller, editor (Resources for the Future, 1963), pp. 163-79.

39. —————————, "The Supply of Urban Public Services," in *Issues in Urban Economics,* Harvey S. Perloff and Lowdon Wingo Jr., editors (Johns Hopkins Press for Resources for the Future, 1968).

40. James H. Thomas, *School Revenue Systems in Five States* (School of Education, Stanford University, 1961).

41. James, H. Thomas, Thomas, J. Alan and Dyck, Harold J., *Wealth, Expenditures and Decision-Making for Education* (School of Education, Stanford University, 1963), Chapter 4. (N)

42. Kee, Woo Sik, "Central City Expenditures and Metropolitan Areas," *National Tax Journal,* Vol. 18 (December 1965), pp. 337-53.

43. Kurnow, Ernest, "Determinants of State and Local Expenditures Reexamined," *National Tax Journal,* Vol. 16 (September 1963), pp. 252-55.

44. Lohnes, Paul R., *New England Finances Public Education* (Cambridge, New England School Development Council, 1958).

45. McCloone, Eugene P., "Effects of Tax Elasticity on the Financial Support of Education" (unpublished doctoral dissertation, University of Illinois, 1961).

46. McMahon, Walter W., "The Determinants of Public Expenditure: An Econometric Analysis of the Demand for Public Education" (unpublished paper, Department of Economics, University of Illinois, 1961). (N)

47. Miner, Jerry, *Social and Economic Factors in Spending for Public Education* (Syracuse University Press, 1963).

48. Montgomery, Albert A., *Washington Expenditures, 1941-1957—An Economic Analysis* (Washington State University Press, 1963).

49. Morss, Elliott R., "Some Thoughts on the Determinants of State and Local Expenditures," *National Tax Journal,* Vol. 19 (March 1966), pp. 95-104. (N)

50. Osman, Jack W., "The Dual Impact of Federal Aid on State and Local Government Expenditures," *National Tax Journal,* Vol. 19 (December 1966), pp. 362-72.

51. Pidot, George, Jr., "The Public Finances of Local Government in the Metropolitan U.S." (unpublished doctoral dissertation, Harvard University, 1965). (N)

52. Prescott, James R., "SMSA Expenditures in the North Central Region: Some Preliminary Results" (paper delivered at the Midwest Economics Association Meetings, April 1966, Columbus, Ohio).

53. Renshaw, Edward F., "A Note on the Expenditure Effect of State Aid to Education," *Journal of Political Economy,* Vol. 68 (April 1960), pp. 170-74.

54. Sacks, Seymour, "Spatial and Locational Aspects of Local Government Expenditures," in *Public Expenditures Decisions in the Urban Community,* Howard Schaller, editor (Resources for the Future, 1963) pp. 180-98. (N)

55. Sacks, Seymour and Harris, Robert, "The Determinants of State and Local Government Expenditures and Intergovernmental Flows of Funds," *National Tax Journal,* Vol. 17 (March 1964), pp. 75-85.

56. Sacks, Seymour and Hellmuth, William F., Jr. *Financing Government in a Metropolitan Area* (Free Press of Glencoe, 1961), pp. 87-132.

57. Schmandt, Henry J. and Stephens, G. Ross, "Local Government Expenditure Patterns in the United States," *Land Economics,* Vol. 39 (November 1963), pp. 397-407.

58. —————————————, "Measuring Municipal Output," *National Tax Journal,* Vol. 13 (December 1960), pp. 369-75.

59. Scott, Stanley and Fender, Edward L., *Factors Associated with Variations in Municipal Expenditures Levels* (Bureau of Public Administration, University of California, 1957).

60. Shapiro, Harvey, "Measuring Local Government Output: A Comment," *National Tax Journal,* Vol. 14 (December 1961), pp. 394-97. (N)

61. Shapiro, Sherman, "Some Socioeconomic Determinants of Expenditures for Education: Southern and Other States Compared," *Comparative Education Review,* Vol. 6 (October 1962), pp. 160-66.

62. Siegel, Barry N., "On the Positive Theory of State and Local Expenditures," in *Public Finance and Welfare,* Paul Kleinsorge, editor (University of Oregon Books, 1966).

63. Spangler, Richard, "The Effect of Population Growth upon State and Local Government Expenditures," *National Tax Journal,* Vol. 16 (June 1963), pp. 193-96.

64. Vieg, John A., *et. al., California Local Finance* (Stanford University Press, 1960).

65. Williams, Oliver P., *Suburban Differences and Metropolitan Policies* (University of Pennsylvania Press, 1965).

66. Wood, Robert C., *1400 Governments* (Harvard University Press, 1961).