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QUANTITATIVE PUBLIC EXPENDITURE ANALYSIS AND PUBLIC POLICY

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I.

With the resurgence of state-local finance as a popular field of graduate study in economics, it was inevitable that quantitative tech-

* I am grateful to Elliott Morss for a helpful reading of an earlier version of this paper. The views expressed below are my own and do not necessarily reflect those of the International Monetary Fund.

niques would be brought to bear on the important financing problems of subnational government. It was as inevitable that experienced public finance practitioners would be wary of academics bearing solutions or explanations cast in terms of regression, factor analytic, or multi-equation models. In that their function is to describe statistically what exists, expenditure determinants studies represent an approach to construct a positive theory of public expenditures. There is nothing normative about this approach. In fact, the implicit stimulus to undertake these studies is the hypothesis that a conglomerate of forces has acted on the public decision-making process to produce a set of expenditure decisions which are related to general socio-economic structure in an ex-ante, unknown (to the government decision-maker) fashion. The avowed role of the determinants studies is to uncover and give meaning to these relationships.

My assignment today involves the question of whether these studies have been successful in achieving their ultimate objective — the influencing of government decisions. And the test of the market in this case must be the extent to which the results of determinants studies influence governmental decisions. The present state of this situation, as I assess it, is that fiscal practitioners have revealed a preference which implies that quantitative expenditure analyses, technique and results, are relatively useless for public policy purposes. That this judgment on the part of the noneconomist layman is at least partially justifiable may be verified by any soul brave enough to tackle the overwhelming determinants literature.¹

On the other hand, it is as apparent that much of the approach, subject matter, and conclusions of these studies are certainly relevant to public policy but still have not found a niche in the public decision-making process. The question of why this is so is one focus of this paper. The steps necessary to remedy this situation is the other. In a more positive vein, the eventual intent here is to suggest how the quantitative approach to public expenditure analysis may become a relevant effort from the point of view of the operationally-oriented government official. Accordingly, the reader will be belabored in the final section of this paper with a fairly abrupt design for future research in this area.

But this ordered and perhaps unduly detailed discussion of the past and future of determinants studies should be prefaced with a brief remark as to kind of communications gap which has risen. Operational public finance professionals are quite often so ignorant of quan-

¹ My own count of expenditure determinants studies now exceeds 75. A partial bibliography is appended here, and a more complete discussion is contained in my "Studies on Determinants of Expenditures: A Review" in Selma Mushkin and John Cotton *Functional Federalism: Grants-in-Aid and PPB Systems* (State-Local Finances Project, George Washington University: Washington 1968).

titative techniques that they have not the slightest idea of what can or cannot be done. Certainly they often find the results incomprehensible and are predictably hesitant to devote much time to trying to determine whether such analyses are at all meaningful. On the other side of the coin, the researchers are often so ignorant of the operations side that they haven't any idea of what should be done. Moreover, their results — even if meaningful — may be presented in an unintelligible (to the layman) fashion. Certainly both groups will have to bend if this line of research is to be brought to bear directly on real fiscal problems. But in the balance of this paper, the burden of proof will be assumed to lie with the researcher. Accordingly, we turn our attention heavily to the issue of how to make this research more relevant, in the belief that if the work is useful, operational people will find use for it no matter how foreign the technique. Certainly if the American military was willing to accept a linear programming model for decision-making purposes, we would not be remiss in believing that public finance professionals would accept meaningful quantitative research.

Specifically, the remainder of this paper covers three general topics. First, the major conceptual shortcomings of the determinants literature are explored. Second, the major results of these studies are discussed with an eye toward whatever synthesis is possible. The concluding section is an enumeration of those research directions which seem most fruitful in terms of yielding information useful for purposes of public policy decisions.

II.

One could venture three basic reasons for the great proliferation of determinants studies in recent years. The major explanation is the absence of a theoretical base from which the determinants of expenditure variations among governmental and spatial units may be inferred. Accordingly, economists have taken a positivistic approach in an attempt to explain what is — naturally the techniques are empirical. Second, the existence of large amounts of more or less comparable and published data have greatly facilitated the development of the positive approach. 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 gives the illusion of being a sophisticated quantitative technique.

But the very factors which have resulted in the outpouring of determinants studies have also resulted in some of their more serious limitations. Incomparabilities and inadequacies in the data and shortcomings in the regression technique are two serious problems encountered in interpreting the results of those analyses. Both prob-

lems are well-documented in the literature; therefore we will not devote attention to them here. Rather the following sections focus on three of the basic conceptual shortcomings of the determinants literature — circularity in the reasoning, a blurring of the concepts of costs and expenditures, and a stark confusion in analysis of the scale economy concept. If such conceptual problems do not completely destroy the creditability of determinants studies, they greatly reduce their usefulness.

*Circularity*²

In one sense, the inclusion of Federal aid as an explanatory variable for aggregate per capita state and local government expenditures 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. A similar problem relates to the use of per capita assessed value as an explanatory variable for per capita expenditures. 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 fairly sterile for public policy purposes. Likewise, the argument that if teachers' salaries are higher, education spending will be higher, adds nothing to the knowledge of the public finance practitioner.

Cost and Expenditures

A second conceptual problem in the expenditure determinants literature stems from 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. To examine the implications of these three alternatives, we may characterize the total variance in per capita expenditures (σ_e^2) as having a quality (σ_q^2) and a cost (σ_c^2) component, such that

$$\sigma_e^2 = \sigma_q^2 + \sigma_c^2 \quad (1)$$

Clearly, if the intent is to explain variations in per capita expenditures, the explanatory variables in the regression model must somehow account for both cost and quality differentials. The second ap-

²In this and in the following two sections, I draw heavily from my paper, "Studies on Determinants of Expenditures: A Review," *op. cit.* See also the work of Edward Gramlich [28].

proach, explaining variations in per capita costs involves specifying the model as

$$\sigma_c^2 = \sigma_e^2 - \sigma_q^2 \quad (2)$$

in which case the quality component must be removed from the total dollar outlay. The third possibility is to treat cost and expenditures as being equal hence assuming that $\sigma_q^2 = 0$.

Since a satisfactory method of eliminating the quality component from expenditures has not been developed, the alternatives in handling the problem are threefold: The first is a highly unrealistic assumption that there are no quality differences among the units of government being analyzed; therefore the independent variables account for only cost variations. The second is to assume that independent variables reflecting only quality differentials can be included among the explanatory variables in the equation, thereby netting out the effects of quality. This approach has yielded great conceptual problems. Hirsch [38] has attempted to include quality as an independent variable to explain per capita education expenditure variations among 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 [62] in examining the relationship between per capita expenditures, population, and service level for 19 cities and villages in Milwaukee County, also attempt to construct a measure of quality, but 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 65 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 ($r = 0.80$), but that no relationship exists between service level and per capita expenditures ($r = 0.07$).

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 third alternative, that of assuming the independent variables to reflect some composite of 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, or even that some combination of a demonstration effect and a wage rollout effect have caused higher wages in the private sector to be transmitted to the public sector. It is this kind of problem which makes a thorough interdependency analysis an imperative prerequisite to any regression analysis. And it is this kind of interpretative difficulty that makes it difficult to base public policy on the results of these studies.

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. In the determinants studies, if a significant negative relationship is observed between per capita expenditures for a service and population, it is often taken to be evidence of 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.

Though demonstration of the efficiency effects of consolidation is no doubt an important and appropriate subject for research, my argument is that this part of the analysis has been so weak conceptually as to render it not useful to the government decision maker. 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. When this analogy to the economies of scale concept is carried to its logical extreme, it seems to be based on the assumption that the population of a govern-

mental 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 nonexistence of economies of scale, i.e., about the nature of the underlying production function. For example, because of population density differentials, the total cost of building and maintaining an identical street in two different areas may be equal, and the regression analysis would show a significant negative relationship between *per capita* expenditures and population size. But this is evidence only of a “cost spreading effect” and of course tells us nothing about an underlying more efficient combination of factors. 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. Until these studies are designed with the governmental production function in mind, little meaningful work will be done on the question of economies of scale.

III.

The determinants literature is too vast for a survey here. But given the purpose of this paper, it would be remiss not to attempt some summary and synthesis of the results of these many studies. In the following section, some attempt is made to put the major contributions in some perspective with the discussion organized first around the governmental unit studied (compared), and second around the functions specifically analyzed. But even this sort of rudely brief treatment can set the stage appropriately for the recommended future research design which is the subject of the following section.

State and Local Studies

Solomon Fabricant is generally given the credit, or the blame, for beginning the determinants literature on the basis of a chapter in his 1952 NBER book on government spending [22]. In that study he applied a regression analysis to a cross section of per capita state and local government spending, aggregated by state to avoid the problems of interstate differences in the division of functional responsibility between state and local governments. He explained significant proportions of the variance in 1941 data, with income the primary determinant of interstate spending differences. Fisher [23, 24] updated the analysis with 1957 data and lent the conclusion that income distribution as well as income level is an important explainer of interstate differences. But as he correctly suggests, the reasons for his finding are not altogether clear. And though the search for new ex-

planations goes on almost endlessly, the literature has not progressed far beyond the conclusion that states with higher incomes spend more. Moreover, we are not really sure what this means. Frank Hanna has shown long ago that interstate differences in per capita income are closely (negatively) associated with interstate differences in the intensity of agricultural employment.³

Then 15 years after Fabricant's work, not much practical mileage has been gained from studies of the socio-economic determinants of aggregated per capita state and local government expenditures. And for good reason. To know that X percent of the among-state variance in per capita state and local expenditures is attributable to variations in per capita income is to know very little that might be useful for public policy decisions. Then rightfully, I think, analysis of state-local aggregate data was turned in the direction of Federal-State fiscal relations — whether that was done correctly is the subject of another member of this panel.

City Expenditures

Because of the great importance of the municipal unit in state-local finance, and because of data availability, expenditure determinants research was turned next to the question of municipal expenditure variations. There have been three large scale statistical analyses of city expenditures — the first by Hawley [35], the second by Brazer [15], and the third by myself [6]. The findings are similar in many respects: (a) intercity income differences are a significant determinant of intercity spending variations, (b) the level of city spending is more closely related to the central city proportion of SMSA population than to the absolute size of the population of the city itself, and (c) the density of population significantly affects the level of per capita spending. But interstate differences in financing methods distort the data, hence the results, to an extent that Brazer notes that the determinants of city expenditures are neither few in number nor readily identifiable, and probably vary widely with state of location.

Accordingly, the next block of empirical research was concerned with analysis of the within-state variance in per capita city of expenditures [15, 51, 63, 69]. The results were disappointing in terms of permitting broad generalizations because the relationship between per capita spending and demographic factors was found to be dependent on the state studied and the year considered. Moreover, most of these studies used some measure of the financial capacity of the city — either state aids or intergovernmental revenues — to explain expenditure levels.

³ Frank Hanna, *State Income Differentials 1919-1954* (Duke University Press: Durham 1959).

Inter and Intra Metropolitan Studies

The incomparability which has distorted the results of city government expenditure analyses is that analyses have been concerned with expenditures *by the city government* rather than *in the city area*. Then we would expect that the next dependent variable treated to be the expenditures of overlapping units of government. In cross-metropolitan analyses, Brazer [15], Kee [45] and Prescott [55] have found agreement that interarea per capita expenditure variations may be attributable to per capita income and to the population size of the city relative to that of the SMSA.

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 SMSA. 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 government may be held constant. With these advantages of a single SMSA, Hirsch used a single equation model on St. Louis data to attempt a forecast of the public service cost effects of consolidation [39]. He found evidence that: (1) for the "horizontally integrated functions" (education, fire, police, refuse collection), there is no evidence of "economies of scale," (2) the cost curve of "circularly integrated functions" (general control) was U-shaped, and (3) for "vertically integrated functions" (water and sewer services) per capita expenditures decline monotonically. But the peculiarities of Hirsch's sample, collinearities in the data, and quality of service variations among the cities casts some suspicion on the analysis. In Schmandt and Stephens' study of 19 Milwaukee county municipalities, it was found that the level of per capita expenditures was unrelated to the level (quality) of public services (number of subfunctions performed) or to population [62]. 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 a smaller population, but at the same per unit cost, some economies of scale exist. Using a somewhat similar procedure, Sacks and Hellmuth [60] could find little evidence of scale economies in their study of the Cleveland SMSA.

Williams has taken a different and certainly noteworthy approach in formulating the model for his analysis of 225 municipalities in the Philadelphia SMSA [70]. 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 func-

tion 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 non-resident 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.

Explaining Variations in Particular Functions — Education

There is general agreement that income level exerts a significant and positive effect on the level of spending for education. Hirsch [36] estimates the income elasticity of demand for education as 1.09 for the period 1950-58; McLoone [48] estimates the national average at 1.34 for the period 1947-57; James [43] 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 lend weight to the importance of the income effect. Fabricant [22], Fisher [24], and Brazer [15] have found interstate (or, in Brazer's study, 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" [38]. He states, however, that assessed value and income are highly intercorrelated.

It is interesting to note that while time series studies have generally shown an income-elastic coefficient for public education expenditures, cross-section studies have resulted in inelastic coefficients, e.g., Fabricant, 0.78 [22]; Brazer, 0.73 [15]; and Hirsch, 0.56 [38]. However,

the latter 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."⁴ 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. This kind of fairly common interpretative difficulty points out the need for extreme caution in making an inference from a cross-section study, and the need for corroborating time series work.

In an extensive work, Sherman Shapiro [65] 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.

Jerry Miner [50] 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."⁵ 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.

⁴ Hirsch [38], italics are mine.

⁵ Miner [50], p. 74.

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 with some apparent success 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 is associated with, 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 [71] with housing density, and Williams [70] 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 [37] 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 25 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 [70], and myself [6] have found that per capita sanitation expenditures 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 as 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 [71] 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.

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 [24, 25] 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* shows 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 [71] 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 [53] found welfare aids to be stimulative (a regression coefficient of 1.34) while Kee [45] found empirical evidence that per capita welfare expenditures in metropoli-

tan areas were significantly higher where responsibility for the welfare program lies with the local rather than the state government.

Conclusions

This summary is grossly incomplete in terms of the number of studies mentioned, and also in that other units have been analyzed. Studies of expenditures by state governments [26, 66, 34], county governments [69], and in county areas [4, 10] have been ignored. But unless this brief review is guilty of important omissions, the determinants literature has produced little for the public decision maker.⁶

Potentially, the more fruitful study will be of the urban rather than state-local spatial unit. And the analysis must take on a different form, i.e., it must be directed to the policy questions. In the next session, one such research design is suggested.

IV.

Given that preceding sections have provided a cursory critique and summary of the state of the art, the object of this section is to lay the boundaries for what ought to be done next. The feeling here is that empirical research on public expenditures could go fruitfully in any of four directions: (1) normative analyses, (2) positive analyses, (3) analyses of expenditure-revenue linkages, and (4) methodological contributions. We consider these possibilities in the following section, in each case evaluating the policy implications of the potential contribution.

Normative Analyses

One major purpose of the determinants-regression studies has been to compare the expenditure behavior of governments or areas which are not homogeneous in terms of their socio-economic and demographic makeup. The kinds of conclusions perhaps sought were, "... even after accounting for its lower income, city A's per capita expenditures are below the national average." But in all cases these analyses were positive, the concern being with comparison and analysis of existing expenditure practices, with a tacit assumption that all units "ought" to perform at least as well as the average. And as a crude estimate of feasibility, this kind of reasoning is not totally useless.

But it should be possible to develop something more than a backdoor approach to public expenditure norms for state and local governments. If it were, the reasoning for public policy purposes would work as follows: First, on a basis of the sociological, economic and demographic structure of the area, what *should* the level of public

⁶ These remarks are not inclusive of the question of the relationship between government spending levels and intergovernmental flows of funds.

expenditures for a particular government or area be? Second, based on the fiscal capacity of the area and other considerations, what level of local government revenue is feasible? Third, the disparity between these estimates of normative expenditure needs and feasible government receipts dictates a first estimate of desirable external financing. The first of these problems is the area in which quantitative public expenditure analysis may be useful for purposes of influencing state-local fiscal planning.

The terribly difficult task of developing a method for estimating a normative level of public spending would seem to be comprised of two elements. The first is the defining and measuring of a "representative expenditure base," i.e., the collection and proper measurement of the many dimensions of urban structure which affect the cost of providing a given unit of a given service. If the "representative tax base" is comprised of the economic characteristics of the community which may affect the yield of some hypothetical tax (personal income level, value of real property, retail sales, etc.), the "representative expenditure base" must be the myriad of the factors which affects the cost of providing some standard service level (poverty population, unemployment, dilapidated housing, annual snowfall, etc.). With the great and growing mass of data on the characteristics of cities, this would not seem to provide a major obstacle. But not so for the second element of the exercise, namely, developing the linkage between the measured expenditure base and a given level of public services. To see the complexity of the problem, take the case of police services. First, an estimate of a proxy for the output of police services would have to be defined. In this case the proxy might be expressed in terms of hour-units of police appearing per person per square mile, or per dollar of assessed value lost to thievery last year, etc. Given the standard police requirement is expressed in some comparable terms, the cost of providing the same standard of police services could be determined for all urban areas. Application of this approach, function by function, would enable a normative comparison of public expenditures.

Though fraught with conceptual and empirical difficulties, there is some research which suggests that this approach is possible. Isard and Coughlin used quite a similar methodology in developing a normative expenditure level for a "new town." And Hirsch [37] has attempted to include some performance measures in a cross-section analysis of refuse collection.

The implications of such analysis for public policy are real. First, it would provide a gauge, when compared with existing expenditure levels, of whether local expenditures were relatively (when compared with other cities) high or low. Second, comparisons of actual with normative spending for specific functions may define an appropriate

set of considerations for budgetary tradeoffs which may increase the efficiency of local public expenditures. Note that this approach to estimating expenditure needs is completely independent of fiscal capacity, which for once would get expenditure researchers off the circularity hook. But perhaps most important would be implications of the development of a representative expenditure structure for state intergovernmental fiscal relations policy. Comparison of how high expenditures should be, with the expenditure level which would be feasible given a normal fiscal effort, will give a measure of the needs-resources gap to be filled via external financing. If these estimates were acceptable, the state government would have guidelines for a program of public-service-equalizing grants. And if there is any validity to the growing argument that the lone salvation of the deteriorating position of the urban fisc is realistic state government fiscal policy, then this topic comes at the top of our priority list.

Positive Analyses

The implicit assumption behind the positive analysis is that a myriad of variables force the average government to reveal a proper preference in terms of a level of per capita expenditures. If the variance among governments in this revealed preference is largely explainable, a normative inference is made. Certainly the positive approach has brought us a long way toward understanding why cities spend as they do, but the marginal contribution of expenditure determinants studies has been diminishing. Yet there would seem some avenues of thought to be followed. First, there remains a need for a positive approach to explaining the wide variance in per capita spending among and within the metropolitan region. But the approach now called for will involve gathering data from local budgets to consider where possible the many subfunctions of each expenditure class, e.g., to identify separately the determinants of police traffic control expenditures and police crime prevention expenditures. Then the hypotheses as well as the analyses should involve great detail. Instead of concluding that income level is positively and significantly associated with the level of police spending, we would like to estimate the (joint) association between police crime prevention spending and dilapidated housing, intensity of welfare recipients, population age distribution, etc. Reasonable statistical results would seem to imply that we may at least understand expenditure variations. Likewise there is room for hard intrametropolitan, even intragovernment, analysis of this kind. I know of no study where the determinants of per capita expenditure variations among areas in the same city are explained. Yet with the kind of census tract data we have, and with the cooperation of government officials, such a study would seem possible.

Recent public employee wage demands in large urban areas should

already have dictated empirical research in the direction of explaining interurban variations in input costs. Hypotheses abound here. For example, certainly there must be a linkage between industry structure and government expenditures which is quite independent of direct needs factors. Where heavy durable goods industries are dominant, average wages tend to be higher and the distribution of wages more equal. If a wage rollout effect from the private to the public sector is operative, it should follow that *cet. par.*, government salaries will be higher in durable goods towns. Since the public sector is heavily labor intensive, this may well be a significant determinant of per capita expenditures.

Finally, a third major need in the field of positivistic research on public expenditures is for time series analysis. Cross section can give a picture of the existing structure and help to identify the comparative position of a government at any given point in time; but only with the most heroic of assumptions can a temporal inference be made. A more pressing need is to explain why per capita expenditure levels have changed — rather than why they are different — and to draw inferences for particular governments. There are two possible purposes for such analysis. The first is understanding, i.e., the empirical results should produce an explanation of how the government in question formulated public expenditure policy in response to structural changes in its physical and socio-economic composition. The second is forecasting, though not in the sense of exact prediction, of future expenditure levels. Rather if a model could be developed to relate expenditure changes to changes in a number of relevant community characteristics, it should be possible to anticipate a range of possible expenditure needs. Such a sensitivity analysis would be quite useful for longer range planning purposes. That is, some state governments have already built socio-economic factors into their school aid formulae in an attempt to offset the disparity-increasing tendency of most existing distribution schemes. But as great a step as this is, it remains wanting because the measures of need are grossly oversimplified.

To date, the shortage of time series work may be blamed on data problems. But fiscal data are now available for relatively long periods of time, and at least the major urban areas have time series data on many potential explanatory variables.

Expenditure-Revenue Linkages

Seymour Sacks opened Pandora's box several years ago when he began probing the relationship between government spending and intergovernmental flows [59]. Since that time, most interest in the revenue-expenditure linkage has centered around the Federal Grants question. Since the Grants topic is not mine today, the view in this

paper is that there are two other, meaningful, approaches to studying this linkage.

One would involve attempting to untangle the relationship between revenue structure, revenue-income elasticity, and expenditure structure and levels. For example, a preliminary scanning of aggregate state-local data suggests that states with a high income elasticity of revenues tend to devote a greater share of their budget to social services. Certainly we could explain the widening disparity in per capita expenditure levels in part with different elasticities. Apart from its effect on tax-income responsiveness, there is a question of how the distribution of receipts among alternative sources (including inter-governmental) is related to the distribution of public expenditures among functions. Intuition alone would suggest that a state revealing a preference for a relatively progressive system of direct taxation, and one revealing a preference for a relatively regressive system of indirect taxation, may also have different preferences on the expenditure division of the tax dollar. The situation may be quite pronounced even within a given state. Some evidence that this kind of linkage does exist could be gained if reapportionment were to bring about changes in the attitude of state legislators with regard to both revenue and expenditure policy. Florida may eventually provide one good case study.

The second interesting linkage between expenditure levels and revenue source lies with a determination of the effects of changes in functional fiscal responsibility. At the local level the allegation is that by internalizing externalities, economies of scale may be realized and a higher level of public services provided for the same cost. But empirically the ball has been fumbled badly with the result that determinants studies have told us nothing about economies of scale. Nor will they since the regression technique is seemingly inappropriate for the purpose, and the economics of model used makes little sense (see the discussion in II above). But from a purely positive point of view some interesting results have been obtained by inserting in the same sample, communities with differing fiscal functional arrangements. The work of Sacks [5, 58], and Campbell and Sacks [16] strongly suggests that a *change* in the state-local division of responsibility, or in the structure of aid formulae, would alter the fiscal balance in metropolitan areas. What remains is first a corroboration of their results with time series data, and a detailed examination, function by function, of the operation of this effect.

Different Techniques

One message basic to this paper is that a major failure of empirical state-local expenditures studies is the indiscriminate use of the regression technique. What the regression technique does is to allow

one to test whether the variation in a set of chosen explanatory variables is systematically associated with the variation in a dependent variable. The technique permits us to say nothing of causation or importance. Then it can be no better than the model specified.

There are other statistical approaches which may be more relevant to some of the problems at hand. The plea here is not for the young academician to begin operating profusely on *Census of Governments* data with each of the empirical techniques in his repertoire, but rather to consider research objectives more carefully in empirical design. Specifically, the multivariate techniques may be helpful in public expenditure studies because of the complex interrelations which always exists among economic variables. Principal components analysis may be used to dimension problems, i.e., to reduce the number of variables to a set of linear combinations or components. Since these components have the property of independence, this approach may offer a way around the troublesome multicollinearity problem which so plagues regression analyses.

Similarly, a factor analysis might be an appropriate way to distinguish underlying common patterns among urban areas. Wood uses this technique successfully in his study of the New York metropolitan region. And canonical analysis will enable the simultaneous consideration of multi-dependent and multi-independent variables, in our case, perhaps toward an end of uncovering broad patterns of common relationship between expenditure structure, and socio-economic structure. Discriminant and classification analysis may also be useful where among-group variations are more meaningful than among-unit variations, or where the problem is to meaningfully re-group data — e.g., are there more meaningful and homogeneous combinations of states than those given by geographic region.

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THE EFFECT OF FEDERAL GRANTS
ON STATE-LOCAL EXPENDITURES:
A REVIEW OF THE ECONOMETRIC LITERATURE

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Federal matching grants to state and local governments have grown from \$6.9 billion in fiscal year 1961 to \$17.4 billion in fiscal year 1968, an average annual rate of growth in excess of thirteen percent. According to the latest Budget Document, they are expected to continue this rapid rate of growth at least until fiscal 1970. As a percent of total state and local expenditures, Federal grants have risen from thirteen percent in 1961 to eighteen percent in 1968 — again a rapid rise considering the rate at which state and local spending has increased over the period. As a final indication of the increasing magnitude and complexity of Federal grants, there have been no less than forty-four important new matching grant programs introduced since 1961, only twelve less than the number introduced in the entire history of the United States up to 1961.

But this explosion in Federal grants and grant programs is nothing compared to the explosion in the literature dealing with the effects of Federal grants. Before 1960 empirical work on Federal grants was nonexistent and theoretical work was almost as rare.¹ Since Brazer (6) and Kurnow (23) made the inevitable discovery that Federal grants "worked" in equations explaining state and local expenditures, however, there has been a flood of studies dealing with the effects of these grants. These studies have either confirmed or denied the importance of Federal grants, from either a theoretical or a statistical

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¹ An early exception was Scott (36).