

Their estimates of the stimulus differed, though. Moreover, little or no research was undertaken on the employment, wage, and output effects of grants. The theoretical and statistical problems with these studies were examined. These problems were: (1) the misspecification of aid variables; (2) the aggregation of government units and public services; (3) the lack of institutional and political realism.

A theoretical model of Oregon counties' expenditure and production decision-making for mental health services was developed based on the insights and criticisms of existing models. The model consists of eleven equations; some describing the "expenditure stage" of the budget process, others describing the "output stage". It was argued that county commissioners make the expenditure decisions, and that mental health administrators make the production decisions. The framework allowed us to examine the effects of mental health grants on expenditures, wages, staff numbers, patient numbers, and output and to study the determinants of grant participation.

Using regression analysis, the equations were estimated from the observations for 31 Oregon counties in fiscal year 1975-1976. Ordinary least squares was used in the expenditure and grant participation equations. Two-stage and three-stage least squares were used in the rest. Regressions were run for western and eastern Oregon counties when possible.

For all observations, the major findings suggested that a dollar of state matching mental health aid per capita stimulated per capita mental health expenditures by \$1.37, increased the professional staff by .556 to .762 persons per 10,000 county residents and increased average professional salaries by \$2,173. A dollar of federal matching aid per capita appeared to have an expenditure effect of \$1.03, an employment

effect of .722, and no salary effect. A dollar of non-matching aid per capita had an estimated expenditure effect of \$1.00, an estimated employment effect of .35, and no salary effect.

In eastern Oregon, the major findings indicated that the marginal expenditure effect of federal aid was \$1.41, the marginal expenditure effect of non-matching aid was \$.96, and that state matching aid had no expenditure effect.

In western Oregon, a dollar of state matching aid per capita had an estimated expenditure effect of \$2.23, a professional employment effect of 1.25, and no significant salary effect. A dollar of non-matching aid per capita had an estimated expenditure effect of \$1.67, and no significant employment or salary effects.

In all regressions, the mental health grant estimates were not statistically different from one another. Finally, a production function for mental health services was unsuccessfully estimated and discussed.

The Fiscal Response of
Oregon Counties to Mental Health Grants

by

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THE FISCAL RESPONSE OF OREGON COUNTIES
TO MENTAL HEALTH GRANTS

CHAPTER I

INTRODUCTION

The Greening of Local Governments

As James A. Wilde recently observed, Madison Avenue may have inadvertently coined a serviceable slogan for state and federal bureaucrats when it suggested that "while we were up, we should get a Grant" (Wilde, 1977, p. 1). Though this brainchild of some adman was not used as an inducement to local governments, the effect was the same as if it had been.^{1/} From 1964 to 1974, state aid to all local governments in the United States rose from \$13 billion to \$45 billion, a 253 percent increase (ACIR, 1977b, p. 7). During the same ten year period, the state of Oregon increased its direct payments to Oregon cities and counties from \$29,021,873 to \$78,889,410, a 172 percent increase (Bureau of Governmental Research and Service, 1975, p. 8). In spite of these extraordinary increases in the amount of state aid dispensed, state aid as a percentage of the total revenues received by local governments in Oregon and the nation remained remarkably stable over the period.^{2/} The reason for this stability was not that property taxes

^{1/} Local government is defined as any non-federal political unit. This would include cities, counties, school districts, and special districts.

^{2/} For the nation, state aid as a percentage of total local revenue increased from 29.4 percent in 1964 to 35.7 percent in 1970. It then fell to 33.9 percent in 1974 (ACIR, 1977b, p. 9). In Oregon, total state payments as a percentage of county and city general revenue decreased from 16.9 percent in 1964 to 14.8 percent in 1974 (Bureau of Governmental Research and Service, 1975, p. 9).

kept pace with the burgeoning state payments, but that federal aid to local jurisdictions increased at even a faster rate than did state aid. Aid from Washington to cities and counties increased over 400 percent from 1965 to 1975, even after excluding revenue sharing, loans, and shared taxes from the calculations (Wilde, 1977, p. 1).

This growth in intergovernmental aid, and the accompanying growth in aid programs,^{3/} can be explained, in part, by the economic and political desirability of grants-in-aid as policy tools and remedies to urban and rural problems. One of the defining characteristics of the grant instrument is that a grant-giving government shares responsibility for the financing of a public service but does not share responsibility for administering that service. The transfer of grant money does not undermine local officials and citizens' ultimate control over how much of any public good or service is produced or how this production is organized; nor does it fundamentally compromise the federalist notion that governmental services should be provided by the smallest possible governmental unit. At the same time, grants are flexible tools that can be designed to accomplish a variety of goals and objectives. Because of the conditions or built-in incentives that can be attached to the money, grants-in-aid allow a higher level government to tinker with a local government's tax, expenditure, and production decisions. Whatever the social problem that a bureaucrat or elected representative may want to tackle -- whether contaminated drinking water, unemployment among teenage blacks, or inadequate support services for the physically handicapped -- a grant scheme could be

^{3/} Gramlich noted, for example, that "There (were) no less than 44 important new grants programs introduced" by the federal government from 1961 to 1969 (Gramlich, 1969, p. 569).

tailored that would appear to produce the desired change in a local government's expenditures and services.

Specific grant types have evolved as a result. These include: federal and state revenue sharing, unconditional transfers distributed to local governments based on need indices; basic school support grants, conditional subsidies in that the money is restricted to payment for educational services; and federal water and sewer treatment construction grants, conditional subsidies obtained by local governments if the local governments match, at some ratio, the federal aid money with local money. This sampling of grant types is not exhaustive. The grant-giving government can distribute aid by formula or by application and approval, can place conditions on the use of money, can require that certain performance or output levels be met, or can require a local government to match the grant funds at any ratio. By mixing and matching the conditions attached to a grant, the grantor can change the incentives to local governments and thus, as has been the intent, use the local governments as "vehicles for policy" (Inman, 1977, p. 1). Revenue sharing, for example, was introduced as an incomes policy instrument that would equalize local communities' ability to pay for public services.

Despite a seemingly clear link between the conditions attached to a grant, the corresponding change in incentives, and the desired change in expenditures and output, the numerous grant remedies have not been wholly successful. As Robert Inman commented about urban domestic policy, "if there has been a dominant theme . . . in the past ten years, it has been a theme of urban problems, new legislation, and observed failure" (Inman, 1977, p. 1). Lester Thurow and a research team

for the ACIR echoed Inman's basic argument in separate analyses of the federal grant system (Thurow, 1970; ACIR, 1977a).

An evident reason for the failure was that policy makers did not fully understand the response of local governments and their residents to different grant programs. As Inman explained, "As simple 'creatures of the state,' local governments were perceived as public serving bodies who played according to legal rules; give them money and they will spend it by the guidelines. But as experience has taught us, the rules were their own" (Inman, 1977, p. 1). Over the past twenty to twenty-five years, economists have tried to supplement our understanding of the effects of different grants on the behavior of local governments. But their efforts have fallen short. To date, debates remain about the proper modeling of local fiscal behavior^{4/} and gaps exist in our knowledge about local governments' budgeting responses to different grant types.

Competing Models of the Local Budget Process

The theory on the output and expenditure effects of grants-in-aid is a subset of the larger theory of the determinants of local expenditure, tax, and output decisions. As economists' assertions about the mechanics of local fiscal choice changed, their derived hypotheses about the effects of grants changed. Early on, the theoreticians that viewed the local budget process as if it were analogous to the optimization of a decision-maker's utility function subject to a budget constraint offered clearcut predictions about the output effects of different

^{4/} Fiscal behavior -- the tax, expenditure, and output decisions made by local governments -- is used interchangeably with fiscal choice and fiscal decision-making throughout the text.

grant structures (Wilde, 1968; Waldauer, 1973). Like an individual in the traditional consumer demand theory, local governments were asserted to respond to the price and income effects of the different grants.^{5/} This utility maximization framework was criticized, though, for its lack of realism in describing the complex budget processes and for characterizing grants-in-aid as price cum income changes (McGuire, 1975, p. 113). Accordingly, competing theories were developed, such as the Median Voter^{6/} and the Bureau-dominated^{7/} models of local fiscal choice, and the predictions about the expenditures and output effects of grants became less clearcut (Niskanen, 1971; Bradford and Oates, 1971a, 1971b; Goetz and McKnew, 1972; Wilde, 1977).

Robert Inman, in his recent review of the literature, further argued that these basic theories, as applied in the empirical studies, proved still too restrictive, "for the complicated processes they (were) meant to describe" (Inman, 1977, p. 3). According to Inman, researchers failed to incorporate public service technologies and administering bureaucracies into their models, failed to develop output measures for public goods, and failed to account for the influence of the budgetary process on wages, grants, the tax base, and the number of persons served. Omitting these factors may have biased the aid

^{5/} For example, an unconditional grant would be treated as a lump sum transfer that would shift the local government's budget constraint in parallel fashion. This will be discussed more fully in Chapter II.

^{6/} Proponents of the Median Voter Model assert that the median voter (generally, the citizen with the median income) dictates the tax and expenditure mix offered by a local government.

^{7/} Proponents of the bureau-dominated models assert that the local bureaucracies determine the local government's budget.

estimates.^{8/} All in all, until researchers refine and test the separate theories of local fiscal choice, a unified theory of the expenditure and output effects of grants will not exist.

The Gaps in Knowledge About Grant Effects

Using multiple regression analysis,^{9/} economists, in a number of studies, have attempted to estimate the effects of grants on state and local government expenditures, full-time staff, or some other proxy for public service outputs. These effects have been studied for all manner of services and local governments, particularly on total spending by state and local governments. Many studies were marred, though, by a reliance on aggregated data. This aggregation took three forms: (1) the melding of different grant types into a single grant variable; (2) the combining of different units of government into a single data base; and (3) the lumping of distinguishable public services into a single category. The tendency of researchers to analyze aggregated data, coupled with the possible specification errors in their estimating equations, has left gaps in our knowledge about the effects of grants. As the research team for the ACIR noted, "Controversy exists about whether grants stimulate certain classes of expenditure or simply result in tax reduction; whether stated allocation goals are achieved best by block or categorical grants; and whether the grant system

^{8/} Kmenta notes that "if the omitted explanatory variable is correlated with the included explanatory variable(s), the estimators . . . will be biased and inconsistent" (Kmenta, 1971, p. 394).

In addition, the least square estimators for certain key explanatory variables may be inconsistent because of potential simultaneous equation problems.

^{9/} Rowntree (1965) analyzed the expenditure effects of grants with other statistical techniques.

significantly equalized variations in recipient governments' financial capacity"^{10/} (ACIR, 1977). The ACIR's list may be appended to include the lack of consensus on the output effects of grants on services provided by particular units of government.

Not all of these problems will be solved in any given piece of research. This study does not, in any major way, fill the holes in information or solve the riddle of public budgeting. What it does do is examine the effects of different types of grants on the spending for and provision of a single service by a single type of local government. The emphasis on a particular unit of government should allow a more complete description of the key elements of local fiscal decision-making, thus, reducing the chances of biased coefficients.

This study does not test any of the competing theories but does mine the theories for useful, though untested, insights. Moreover, this study does not compare the purported objectives of the grant programs to the reported impacts, nor does it look at the issue of the proper design of the grant programs.

Mental Health Grants and the Provision
of Mental Health Services by Oregon Counties

The specific question posed in this study is the following: how do the different types of mental health grants received by Oregon counties affect the counties' budgeting and production decisions? The importance of this question is underlined by the phenomenal growth in payments from the state to county mental health programs. Between 1964 and 1974, state payments for community mental health clinics and

^{10/} Block grants are what were referred to as unconditional grants earlier. Categorical grants are the same as conditional grants.

drug programs jumped from \$233,244 to \$2,825,119 -- an increase of 1,110 percent (Bureau of Governmental Research and Service, 1975, p. 8). This growth can be attributed to a shift in philosophy on how the mentally, physically, and emotionally disabled should be treated. "De-institutionalism" and "community-based care" are now the catch phrases of mental health practitioners and legislators. According to the reigning dogma, only those persons with the most severe forms of mental illness should be segregated and treated at mental hospitals; the majority of persons could and should be treated at community mental health care clinics. In Oregon, the 32 county-based programs have become the focal point of this shift in emphasis.^{11/} Between 1975 and 1977, county clinics cared for 74,566 persons with mental and emotional problems, 15,840 persons who were mentally retarded or had developmental disabilities, and 15,778 persons with drug and alcohol problems (Oregon Mental Health Division, 1975d, p. 17).

The transition from long-term institutionalization to local outpatient care has had its associated costs. Alice Porter, in a recent Willamette Week story, compared mental health care in Multnomah County to a revolving door -- spinning the mentally ill around and in and out, all the while, not moving them anywhere (Porter, 1978). She identified three problems in Multnomah County:

- (1) The lack of access for the "general low income public" because the outpatient clinics are burdened by chronic patients and because of the high price for private psychiatric services.

^{11/} This shift was made explicit in the most recent budget statement of the State of Oregon Mental Health Division. As a goal for the 1977-1979 biennium, the division proposed to reduce the annual admissions of persons to state mental health hospitals by 20 percent. These persons would, in the future, be serviced by county programs.

- (2) The "dumping" of former hospital patients into the overburdened county programs and into communities that lack adequate support networks of housing, companionship, and jobs.
- (3) The resulting high rate of readmission into the state hospitals.

Constance Holden, in a recent Science article, supported Porter's arguments when she said, "(f)or most, the concept of 'community care' is no more than a sad joke" (Holden, 1978, p. 1,366).

If these problems are to be resolved, then we must, as a beginning, understand how Oregon counties and their citizens respond to the incentives of the mental health grants, a major source of revenue for the county programs. The county departments receive three types of grants from the state and federal governments to underwrite the costs of service. The state Mental Health Division provides a 50-50 matching grant to partially finance the costs of community mental health clinics, detoxification centers and halfway houses.^{12/} Both the state and federal governments offer 100 percent non-matching grants to Oregon counties to pay for the costs of specific programs such as antabuse distribution, training and counseling for parents of children with developmental disabilities, and school programs for the trainable mentally retarded.

A third kind of grant is received by thirteen eastern Oregon counties.^{13/} In July, 1972, the federal government instituted a program to help pay the staffing costs of the eastern Oregon mental health departments. This "staffing grant," the backbone of the mental health

^{12/} In a 50-50 matching arrangement, the county government is required to provide one dollar for every dollar allocated to the county by the state.

^{13/} The thirteen counties are: Baker, Grant, Harney, Malheur, Sherman, Wasco, Hood River, Morrow, Umatilla, Union, Wallowa, Wheeler, and Gilliam.

clinics in the thirteen counties, is planned to last until 1980. It is a matching grant with the condition that in each succeeding year the federal government pays for a smaller amount of staffing costs. In 1972, for example, the federal government paid for 90 percent of the staffing costs, the state paid for five percent, and the individual county paid for five percent. In 1980, the federal government plans to pay for 70 percent of staffing costs, while the state and county governments will divide the payment for the remainder of the costs. As anticipated, the staffing grant spurred some eastern Oregon counties into establishing mental health programs (Interview with George Fisher, Director of Grant County Mental Health Department, October 14, 1977). In this way, it has been a successful policy instrument. Whether the secondary aim of the grant will prove successful -- the goal that the eastern Oregon counties will finance the same level of services when the federal government provides no grant money -- is open to debate.

Objectives and Procedures

This research is entitled "The Fiscal Response of Oregon Counties to Mental Health Grants". The term "fiscal response," like many of the terms and phrases in this literature, is a vague and flabby term unless defined. In this study, it refers to how the tax, expenditure, and production choices made by local officials at budget time and during the fiscal year are changed after grants-in-aid, shared tax revenues, income tax credits, property tax relief, or any other policy instruments are introduced. Specifically, these decisions have been artificially divided into two stages for this study. In the "expenditure stage," elected representatives determine the level of spending for local bureaus

and generate a given level of tax revenues that, along with the non-tax sources of revenue, pays for these expenditures. In the "output stage," the local bureau heads choose a combination of labor, material, and capital inputs to produce some quantity of public goods given an expenditure ceiling, the wage rate for employees, and fixed rental prices.^{14/} These choices, in turn, are assumed to influence the amount of grants-in-aid received and the number of persons served. All in all, then, the fiscal response of Oregon counties to mental health grants refers to the effect of these grants on (1) the amount of money allocated to particular services, (2) the tax revenues generated, (3) the number and type of staff purchased, (4) the employees' wage levels, (5) the number of resident-users served by the departments, and (6) the quantity of public goods produced.

This notion of fiscal response has been given content in this research through a set of eleven estimating equations. The data for the regressions have been collected from 31 Oregon counties for the fiscal year 1975-1976. The regression results will be analyzed with the two broad objectives of this study in mind:

- (1) Evidence either confirming or rejecting the hypothesis that mental health grants stimulate spending for mental health services and the hypothesis that mental health grants are significant determinants of the production choices made by Oregon county officials.
- (2) Information as to whether the three types of mental health grants have significantly different effects on the spending and output decisions.

^{14/} "Bureau" is defined as any public service department, such as the police department, the mental health department, or the fire department.

Embodied in these broad objectives are many specific hypotheses about the effects of mental health grants. .

In the expenditure stage, the per capita current expenditures for mental health services and other county services are asserted to be determined by the maximization of a county commissioner's preference function subject to a county budget constraint. Accordingly, both dependent variables are assumed to be systematically related to:

(1) federal staffing grants per capita, (2) matching state mental health grants per capita, (3) non-matching mental health grants per capita, (4) unconditional grants per capita, (5) the per capita conditional grants earmarked for non-mental health services, (6) the per capita, before-tax income in the county, (7) cash balances per capita, and (8) the residential fraction of the property tax base.

The estimated regression coefficients for the mental health aid variables will be tested to see: (1) if they are significantly greater than one in mental health expenditure equation, and (2) if they are significantly greater than zero in the equation attempting to explain spending for non-mental health services. In both, the estimates will be tested to see if they are significantly different from each other. These regressions will be run separately on the 31 county observations, on the data from the 13 eastern Oregon counties that receive the federal staffing grant, and on the observations for the remaining 18 western Oregon counties. While a formal test will not be made, the estimates for the mental health grant terms will be compared for the eastern and western Oregon counties.

The final portion of the expenditure stage analysis is composed of three linear equations attempting to explain the levels of the three

types of mental health grants received by counties. These grant variables are assumed to be functionally related to: (1) the expenditure per capita in the previous year for mental health, (2) the number of clients served in the previous year, (3) the percentage of patients considered improved in the previous year, (4) the population of the county in the previous year, (5) the per capita county income in the previous year, (6) the number of mental health professionals per 10,000 community residents practicing privately in the previous year, (7) the per capita amount of grants received by private mental health agencies in the previous year, and (8) the county unemployment rate in the previous year. These ordinary least square regressions will be tested for the overall significance of the equation. As for the expenditure equations, a comparison will be made between the estimates for the eastern and western Oregon counties. In addition, the grant and expenditure equations will be tested for possible heteroskedasticity, autocorrelation, and multicollinearity.

The output stage of the proposed model consists of six equations determined simultaneously or recursively. For these equations, two-stage and three-stage least square estimation procedures will be used. The derived demand for skilled and lesser-skilled mental health staff per 10,000 county residents are assumed to be functions of: (1) federal staffing grants per capita, (2) the matching state mental health grants per capita, (3) the non-matching mental health grants per capita, (4) average annual salary for skilled staff, (5) the average annual salary for lesser-skilled staff, (6) the number of patients served, (7) cash balances per capita, (8) the residential fraction of the property tax base, (9) the average county before-tax income, (10) un-

conditional grants, and (11) conditional grants. The corresponding labor supply functions, in which the average salary level for the skilled and lesser-skilled staff are the dependent variables, is composed of the independent variables: (1) federal staffing grants per capita, (2) matching state mental health grants per capita, (3) non-matching mental health grants per capita, (4) the number of patients served, (5) the average salary in the private service sector, (6) the per capita income in the county, (7) population density, and (8) the number of mental health professionals per 10,000 community residents practicing privately.

In all of these equations, two basic tests will be undertaken. Firstly, to determine whether the mental health grant coefficients are significantly greater than zero. And, secondly, to determine whether the coefficients differ from each other. The regressions will be run separately for the western Oregon counties. These results will be compared with the findings from a total county regression that contains three dummy variables; an intercept dummy separating the eastern Oregon counties from the remaining Oregon counties, and two interaction dummies for the matching and non-matching mental health grant terms.

The number of patients served by the county programs is assumed to be determined by (1) federal staffing grants per capita, (2) matching mental health grants per capita, (3) non-matching mental health grants per capita, (4) the county population, (5) the county population density, (6) the number of practicing mental health professionals per 10,000 county residents, (7) the per capita grants to private mental health agencies, (8) the percent skilled staff, and (9) the per capita county income. The same tests of hypotheses are run for this regression. Similarly, this regression is run for the different data sets.

The last equation in the output stage and the final equation for the complete model attempts to explain the percentage of patients considered "improved" when they leave the services of a county mental health program. This percentage is assumed to be a function of: (1) the number of skilled mental health staff per 10,000 county residents, (2) the number of lesser-skilled mental health staff per 10,000 county residents, (3) the per capita materials and capital expense for a county mental health department, and (4) the number of patients served by the program. Each independent variable will be tested to see if it is significantly different from zero.

Organization of Thesis

Chapter II is a discussion of the typology of grants; the utility maximization, median voter, and bureaucratic models of fiscal behavior; and the theory of the expenditure and output effects of grants.

Chapter III is a discussion of the empirical findings on the effect of grants and theoretical and statistical problems of previous studies.

In Chapter IV, the model and estimating equations will be specified more fully, and the sources for the data will be identified.

Chapter V contains the findings for the regressions and a discussion of the results. Finally, the summary and conclusions from the research are presented in Chapter VI.

There are, in addition, four appendices. Appendix I contains summaries of selected models of fiscal behavior. Appendix II provides a listing of the sources of information. The questionnaire used in obtaining data on county mental health activities is presented in Appendix III. Finally, Appendix IV provides the results from selected regressions.

CHAPTER II

EXPENDITURE AND OUTPUT EFFECTS OF GRANTS: THEORY

Typology of Grants

"The effects of intergovernmental grants, both on the allocation of resources and the distribution of income," wrote Wallace Oates, "depends fundamentally on the political process by which the recipients make their collective fiscal decisions" (Oates, 1972, p. 74). In the theoretical literature, there has been no consensus on how this "political process" should be modeled. Because of the diversity of approaches, Marvin Johnson in 1976 proposed a typology of fiscal models (Johnson, 1976). He catalogued theoretical and empirical studies into one of six categories based on the author's assertions about the important actors in the government marketplace, the constraints these actors face, and the bargaining taking place among the principal actors.^{1/} Of the six types of models, three have been the basis for theoretical studies of the expenditure and output effects of grants -- the Constrained Maximization and Median Voter models, which emphasize the demand side of this non-price allocation system, and the bureaucratic model of fiscal decision-making, which emphasizes the supply side of the market for publically provided goods.

^{1/} The six types of models are: (1) Constrained Maximization, (2) Public Choice, (3) Organization, (4) Median Voter, (5) Budget Maximization, and (6) Pragmatic Empirical.

The Pragmatic Empirical studies essentially have no theoretical underpinning, instead subscribing to the argument that "a fully articulated model of government decision-making ... lies beyond ... the state of the art" (Pidot, 1969). Organization theory, a management analysis of the budget process, details the step-by-step decisions made in creating a budget. The Public Choice model, according to Johnson, has been used only in theoretical analyses of public goods.

The purpose of this chapter is to describe each of these main models and to examine the theoretical studies on grants. To aid these discussions, a classification of grants is first provided.

Classification of Grants

Grants have been differentiated traditionally by the conditions placed on the use of the funds and by the level and method of financing. The use-related distinctions are: (1) whether grants are Unconditional and have no restrictions on the use of the money or Conditional and are restricted to underwrite the costs of a particular service; and (2) whether the grants can be used to offset the costs of specific local inputs, such as payroll costs, or can offset the costs of any local input. The financing-related distinctions are: (3) whether grants are matching or non-matching; and (4) whether grants are open-ended with no limit on the amount of aid money that local governments receive or closed-ended.^{2/} Since each of these categories is independent of the rest, there are 16 possible grant types, each with its literally breathtaking label.^{3/} Only a few of these grant types are consistently used by donor governments, though. Moreover, for this study we are concerned with only four types of grants:

- (1) Unconditional non-matching grants;
- (2) Conditional non-matching grants with a limit on the available money;

^{2/} Another distinction can be made between grants dispensed on an application and approval basis and those distributed by a formula. Other conditions can be placed on a grant transfer, such as output requirements -- but these additional conditions have not been used to classify grants.

^{3/} For example: a closed-ended conditional matching grant that underwrites the cost of specific inputs.

- (3) Conditional matching grants with a limit on the available money;
- (4) Conditional matching grants with a limit on the available money that, in addition, finance only specific local inputs.

Since there is some debate in the literature as to what is an open-ended or closed-ended grant, this distinction has been included in Figure 1, a tree diagram of the grant types (Gramlich, 1969).^{4/}

Expenditure Effective of Grants-in-Aid:

Constrained Maximization Model

The Constrained Maximization Model^{5/} was the theoretical framework for empirical studies by Osman (1966), Henderson (1968), Gramlich (1968), O'Brien (1971), Inman (1971), Gramlich and Galper (1973), Tresch (1974), Johnson (1976), and Bahl and Pillai (1976). As the name implies, this framework unabashedly mimics the theory of consumer demand. Hence, the observed budget allocations for any school, city, or county government are seen by proponents of this model as the utility maximizing choices of a single "decision-maker" limited by a finite amount of government revenue. What distinguishes this model from the median voter and bureaucratic models, both patterned after the analytics of the utility maximization framework, is in the choice of the decision-maker.

Unlike the researchers who based their empirical work on the median voter or bureaucratic models, the researchers listed above were not con-

^{4/} The debate stems from the observation that donor governments could never provide an unlimited amount of money. The counter-argument is that the ceiling for these grants is well beyond what locals could spend.

^{5/} The Constrained Maximization Model has also been referred to as the Utility Maximization Model and the Dominant Party Model.

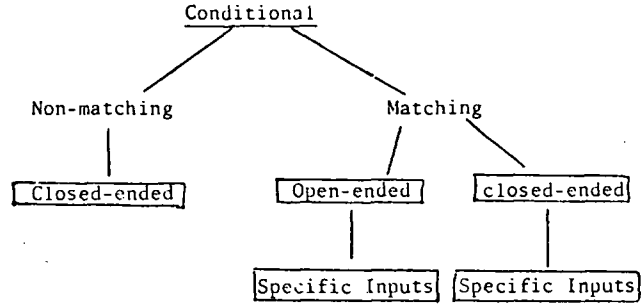
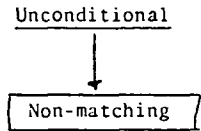


Figure 1. Classification of Grants.

cerned with political realism. Dismissing the assumptions of the alternative models, they argued that this decision-maker could not and need not be identified. Taking a leap of faith, they posited simply that the budget decisions for a local government -- choices involving a number of different individuals -- could be reduced to the utility maximizing choices of a single individual. In fact, Theil argued that the utility maximization framework might be more applicable to group decisions (Johnson, 1976, p. 56).

A more sophisticated rationale for the Constrained Maximization Model was recently sketched by Inman (Inman, 1977). This rationale stems from a Frank Skeffington view of local politics. In this scenario, the elected officials dominate tax and expenditure decisions, while voters are relegated to a minor role. Because issues are complex, few citizens can afford to spend the time and money required to collect and analyze the facts. As a result, the majority of residents, frustrated by the high cost of information, do not vote. Those who do are generally part of small but disciplined cliques of like-minded voters or competing organizations, such as the Democrats and Republicans, who stand to gain from the local budget allocations. These unified bands of citizens work vigorously for their candidates in return, often, for patronage jobs and dollars. The political fortunes of these competing groups depend on their ability to maintain the organization's cohesion and to capture a sufficient number of independent voters in elections. Once the organizations put their candidates in office, the candidates tend to stay in office because of the political leverage gained from making the budget decisions. The bottom line is long one party (or organization) control of the key elected positions.

A natural offshoot of the tight organization discipline and ideology is that the candidates presented to the voters are brought up within the ranks. When in office, consequently, these candidates -- true party members to the last -- represent the voice of the clique, even in their choice of department administrators. This extended control of the local government machinery by the elected officials imbues a consistency in budget decisions. Accordingly, the local expenditures for public goods can be realistically thought of as the utility maximizing choices of the elected representatives.

Though they may posit a simple or sophisticated rationale for the framework, the proponents of the Constrained Maximization Model of local fiscal decision-making agree that local budget decisions can be reduced to three constructs: (1) a utility structure, (2) a budget constraint, and (3) utility maximizing behavior. It has been generally argued that the local decision-maker has a preference structure that comprises the output for local public services and after-tax community income. For the most part, researchers have argued that factor cost-deflated expenditures are a satisfactory proxy for output.

$$(1) \quad U = U(X_i, Y)$$

where X_i = cost-deflated expenditures for public service i

Y = after-tax income

Since local governments are legally bound to balance their budgets, the decision-maker faces a revenue constraint in which the before-tax community income plus lump sum grants-in-aid equal the expenditures for the public services and after-tax income.^{6/}

^{6/} The revenue constraint might be only for the local government's budget such that incoming revenue (grants and taxes) equal expenditures on the services. In that case, some form of tax burden is included as an element of the utility function.

$$(2) \quad G + I = (1 - M)P_x X_i + P_y Y$$

where G = lump sum grants-in-aid, I = before-tax income,
 P_x = Price for public service i , and P_y = price of
 after-tax income.

$1 - M$ = one minus the matching rate for open-ended
 matching grants.^{7/}

Maximizing the decision-maker's preference function subject to the budget constraint results in a series of demand equations for public expenditures and after-tax income as functions of the budget elements and prices.

Grants, as can be seen, fit neatly into this framework. As revenue sources, they are asserted to alter the budget constraint limiting the choices of the decision-maker. In fact, the classic theoretical reference on the expenditure and output effects of grants relied on the constrained maximization framework.

James A. Wilde used, in his words, "this basic model . . . in analyzing how grants-in-aid programs could be expected to influence the expenditure levels of recipient governments" (Wilde, 1968, p. 340). His unit of analysis was any grant-receiving local government, whether a city, county, school district, or special district. The unidentified decision-makers for these governments were assumed to have consistent (convex and non-intersecting) preference structures consisting of public and private goods. Maintaining the correspondence with consumer demand theory, Wilde further argued that the total amount of money available in a community acted as a budget constraint for the local government decision-maker. The mix and level of spending for the local government

^{7/} It will be explained in the succeeding pages why this type of grant is entered as a price variable in the budget constraint.

was determined, he posited, by the maximization of the decision-maker's preference function subject to the budget constraint.

Wilde traced the effects of four types of grants as the hypothetical budget constraint for the government shifted in response to the conditions attached to each of the grant types. The four grant types examined were:

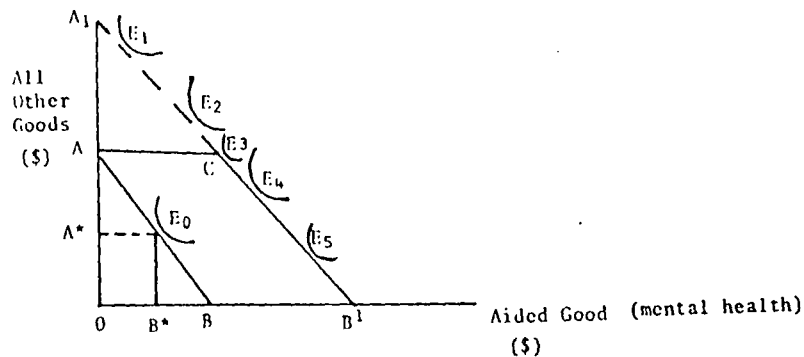
- (1) Unconditional non-matching grants;
- (2) Conditional non-matching grants;
- (3) Conditional matching grants with a limit on the amount of available grant money;
- (4) Conditional non-matching grants with no limit on the amount of available grant money.

With hypothetical indifference curves included, the expenditure and output effects of the four grants are illustrated in Figure 2.

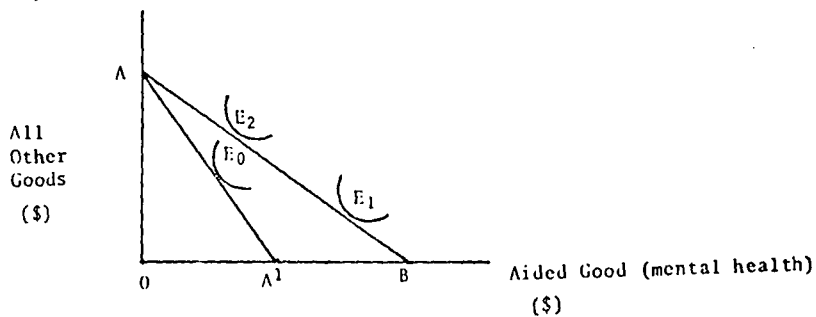
Figure 2A compares the possible responses of a recipient local government to an unconditional non-matching grant and a conditional non-matching grant. The axes of this and the other diagrams are measured in dollars. The horizontal axis represents a local government's expenditures for a particular good, in this instance mental health goods, and the vertical axis represents community expenditures for all other public and private goods. Since Wilde assumed that the expenditures for public and private goods are valid proxies for the quantity of public and private goods produced and consumed, it would be as legitimate to measure the axes in quantity units.^{8/} To maintain continuity and to avoid confusion, we shall talk only about the community's expenditure for goods.

^{8/} Wilde assumed that prices were fixed and constant.

A. Conditional and Unconditional, Non-Matching Grants



B. Open-Ended, Conditional, Matching Grants



C. Closed-Ended, Conditional Matching Grants

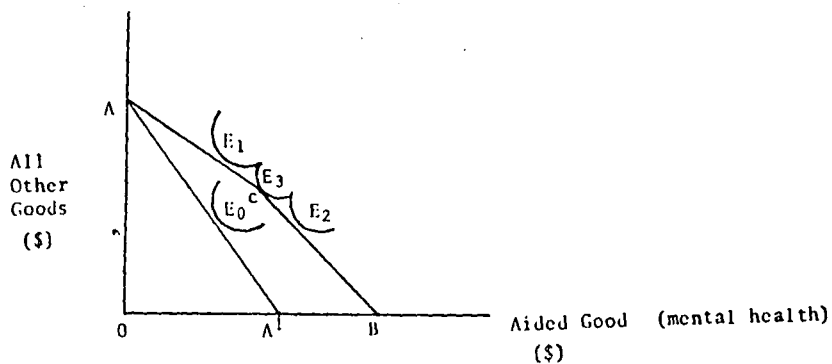


Figure 2. Indifference Curve Analysis of the Expenditure Effects of Selected Grants: Constrained Maximization Model

It must be remembered, though, that the expenditure and output effects of grants are identical in the Wilde analysis.

There are two additional points to be noted about the diagrams and the upcoming discussion. Expenditures for "all other goods" can be separated into: (1) the spending for the other public goods produced by the local government and (2) the spending for private goods. While grants-in-aid directly affect the spending for public goods, they indirectly affect the spending for private goods by changing the amount of local tax payments. When local taxes increase (fall), spending for private goods falls (increases), ceteris paribus. Unfortunately, no direct statement can be made in Wilde's analysis about the effect of grants on private good or other public good spending because these two components of spending have been lumped into a single spending category. Accordingly, when a grant is said to increase total spending for all other goods, this does not necessarily imply that expenditures for other public goods and expenditures for private goods have both increased.

Returning to Figure 2A, the Line AB describes a hypothetical resource opportunity line for a local government in a pre-grant situation. Before receiving any grant subsidy, the community is spending OB^* for mental health goods and OA^* for all other goods, a bundle symbolized by the tangency point E_0 . We will assume, for the moment, that this placid equilibrium is disrupted by a state government transfer of A^1A (B^1B) dollars of unconditional non-matching grant money to the local government.^{9/} Because it augments community income unconditionally, the grant money shifts the budget constraint in parallel fashion to A^1B^1 .^{10/} The new

^{9/} This analysis does not consider the sources of the state government's revenue.

^{10/} Mohan and Johnson (1968) have shown, though, that unconditional grants distributed to recipient governments by a formula may have a price effect.

equilibrium spending levels of mental health and all other goods are determined by the expenditure equivalent of the decision-maker's income consumption curve. In other words, the change in spending for public and private goods depends on the decision-maker's income elasticity of demand for expenditures for those goods.

The marginal change in expenditures for a good due to an unconditional grant is what Wilde called the marginal propensity to spend on the aided function. In mathematical parlance, it is the partial derivative of expenditures for a good with respect to unconditional grants or $\frac{\partial E}{\partial G}$ where E represents expenditures for a particular public good, and G equals the amount of the unconditional grant. Table 1 shows the connection between the income elasticities for the different categories of goods, the spending for mental health goods, and the graphical analysis in Figure 2A.

If, for example, mental health and all other goods were normal goods (i.e., positive income elasticities) for the decision-maker, spending for these goods would increase in response to the unconditional grant, as indicated by the points of equilibrium E_2 , E_3 , and E_4 . The grant, in these instances, has only fractionally stimulated spending for these goods. In other words, a dollar of the grants stimulated spending in both categories by a positive amount that is less than a dollar.

When the decision-maker's income elasticity for all other goods is negative, we are in a situation represented by the new equilibrium point, E_5 . In that event, the full amount of the unconditional grant was diverted into spending for mental health goods. In addition, the local government has diverted local tax money previously used for expenditures

TABLE 1. Effects of Unconditional Non-Matching Grants on Local Government Spending: Constrained Maximization Model

	Income Elasticity	Partial Derivative of Expenditures on Grants	Corresponding Equilibrium Position(s) in Figure 2A
1.	$\eta\gamma E < 0$	$\frac{\partial E}{\partial G} < 0$	E_1
2.	$\eta\gamma A > 0, \eta\gamma E > 0$	$0 < \frac{\partial E}{\partial G} < 1$	E_2, E_3, E_4
3.	$\eta\gamma A < 0$	$\frac{\partial E}{\partial G} > 1$	E_5

E is total expenditures for a public good (mental health).

G is the unconditional, non-matching grant, $\eta\gamma E$ is the income elasticity for mental health spending, and $\eta\gamma A$ is the income elasticity for spending for all other goods.

for all other goods into mental health expenditures. The flip side of this spending response exists when mental health goods are inferior goods (E_1). Then, tax money previously supporting mental health programs is diverted into increased spending for other public goods, increased tax relief, or some combination of each.

The transfer of B^1B (AC) dollars of a non-matching grant earmarked for mental health programs would shift the local government's budget constraint to ACB^1 in Figure 2A. In the Wilde analysis, the expenditure response of a local government to a conditional non-matching grant must be understood in terms of the response of the local government to an unconditional non-matching grant of the same dollar amount. If an unconditional grant prompted a spending response represented by either of the new equilibrium points E_1 or E_2 , a conditional non-matching grant would shift spending to the point E_3 . If an unconditional grant prompted any of the spending responses represented by the equilibrium points E_3 , E_4 , or E_5 , a conditional grant of the same dollar amount would induce the same the same shifts in spending. Responses exemplified by the points E_1 , E_2 , and E_3 ^{11/} demonstrate that grants earmarked for a specific good can be, in fact, implicit subsidies for other public and private goods. At point C, though spending for mental health programs has increased, the local government is spending none of its own tax money on the programs. This money is freed up for other spending or tax relief.

Wilde, in a later essay, further noted that "should the recipient government not have spent anything on the aided function in the pre-grant situation, we are clearly in the . . . case with a corner solu-

^{11/} These points all collapse into point E_3 after a conditional non-matching grant is introduced.

tion" (PT. C. here) (Wilde, 1977, p. 5).^{12/} As Wilde further added, "Where the donor government gets the recipient to undertake its first activities in some area, the stimulative effect could be as much as 100 percent of the aid given" (Wilde, 1977, p. 5).

Figure 2B illustrates some typical responses of a local government to a matching grant earmarked for mental health programs that has no limit on the amount of available money. The grant shifts the local government's budget constraint from AA^1 to AB, in effect, reducing the price for mental health goods. The "as if" price reduction would, in all likelihood, increase spending for mental health goods. The precise spending response would depend on the price elasticity of demand for mental health spending.

Figure 2B presents two possible reactions to the grants. If the community decision-makers adjusted spending to the equilibrium point E_1 after receiving the grant, they have increased the funding for the service from their own tax money, with an accompanying decrease in spending for other public goods or an increase in taxes. If, instead, they adjusted spending to point E_2 , a portion of the tax money previously spent on mental health goods was diverted to tax relief or increased spending for other publicly provided goods. The key point is that "only specific (conditional matching) grants . . . could be expected to increase expenditures by more than the amount of the grant" (Wilde, 1968, p. 347).^{13/}

Figure 2C illustrates the expenditure effects of a conditional matching grant available to the local government in limited dollar amounts.

^{12/} The upcoming discussion of McGuire's research shows that this may not be the case.

^{13/} Wilde's implicit assumption is that all public and private goods are normal goods.

The post-grant budget constraint is traced by ACB, where point C identifies the donor government's ceiling on the available grant money. Should the recipient government choose to receive less than the full amount of the aid offered, the new equilibrium spending level would occur on the price facet (segment AC) of the budget constraint. The adjustment in spending indicated by point C implies that the local government used the ceiling amount of available aid as the sole revenue sources for its mental health program. In the final hypothetical response (point E_2), the grant induced the local government decision-makers to spend more than the amount of the grant on mental health programs. Since E_2 is part of the income facet of budget constraint (Segment CB), the stimulative effect of the conditional grant is the same as that of an unconditional grant. Because of the many possible expenditure responses to this grant, the question whether the grant ceiling effectively constrains the recipient government's spending and output decisions becomes particularly critical to policy and empirical work.

In sum, two general conclusions are born from Wilde's analysis: first, that different types of grants should be analyzed in terms of their price and income effects, a la the neoclassical theory of demand; and second, that different grants could be expected to induce different spending and output patterns.

With these conclusions in mind, Edward Gramlich outlined in his review article a "remedy," a "common framework" for analyzing the expenditure and output effects of grants (Gramlich, 1969a). He was disturbed by researchers' "narrow perspective of grants." As he stated,

"Aside from a very few studies, the research on the effects of grants has tended to go in diverse directions, paying little heed to work done on other aspects of the

same question. Those concerned with improving grant policies generally have not consulted the theoretical and empirical work on the subject. Those concerned with theoretical questions have generally not shown how their theories could be tested empirically and those doing empirical work have generally given little attention to testing federal grants for significance, to determining whether estimated coefficients violate a priori theoretical or institutional constraints and to making their studies relevant to policy questions" (Gramlich, 1969a, p. 580).

His framework, a guide for sidestepping the mistakes of previous empirical studies, consists of three major parts: (1) classifying all grants received by the government or governments under observation according to the conditions attached to the grants and the anticipated spending response of the local government(s) to the grants -- each classification serving as an explanatory variable; (2) identifying these grant variables as "income" variables entered in the estimating equations as total dollar flows or "price" variables entered as some form of the matching rate (that is, its price effect); and (3) interpreting the coefficient on the grant variables as to whether they "stimulate" expenditures or "substitute" for local tax dollars previously spent on an aided good.

Gramlich's insights into the first two parts of this process stem directly from the Wilde analysis depicted in Figure 2. Each of the four grant types analyzed in Figure 2 should, in the Gramlich scheme of classification, be entered as separate variables, since each could be expected to induce a unique spending response. Unconditional and conditional non-matching grants should be entered as dollar flows because each essentially supplements the local budget. In contrast, a conditional matching grant without a limit on the available money should be entered as a price variable because it effectively reduces the price of an aided good. Finally, a conditional matching grant with a limit on the avail-

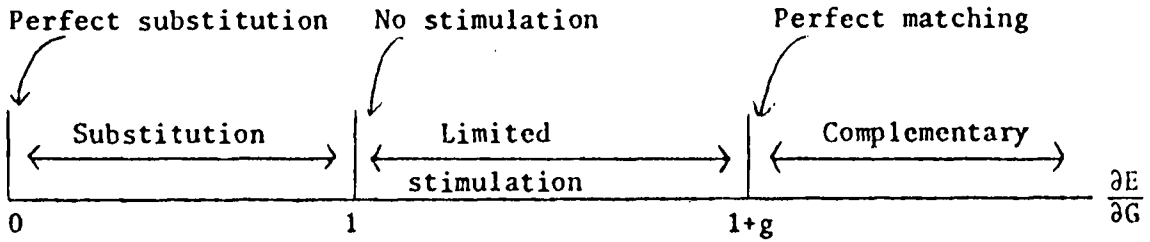
able donor government match could be entered as either a dollar flow or as a price for the aided good depending on whether the grant ceiling influences local budget decisions.

Gramlich also suggested a method for interpreting the coefficients on a conditional matching and non-matching grant variable entered as dollar flows. His method is illustrated in Figure 3.

Gramlich's figure describes, basically, the range of spending responses of local governments to conditional grants. A partial derivative of expenditures with respect to grants $\frac{\partial E}{\partial G}$ of 1 marks the basic boundary of a grant's performance. As Gramlich wrote, "If $\frac{\partial E}{\partial G}$ is greater than one, that is, if state and local governments spend all of the (grant) money and some of their own besides, . . . grants are said to stimulate state and local spending from own funds. If $\frac{\partial E}{\partial G}$ is less than one, . . . grants are said to substitute for own expenditures" (Gramlich, 1969a, p. 572). Relating this to Figure 3, conditional non-matching grants may either be stimulative (to the right of 1 on the $\frac{\partial E}{\partial G}$ scale line) or substitutive (to the left of 1 on the scale).^{14/}

For conditional matching grants with an effective aid ceiling, Gramlich split the notion of stimulation further, based on whether the recipient government spends more or less than it must to satisfy a legal matching rate. This rate, g in Figure 3, is defined as the amount of local money legally required to match a dollar of the grant money. For example, if a recipient government is required to match the conditional grant money dollar for dollar, g equals 1. In the Gramlich classification of coefficients, when a conditional grant coefficient is less than $1 + g$ but still greater than 1, then the grant is said to have

^{14/} Gramlich's use of the words stimulative and substitutive may be misleading because of the possible fallacy of regression in cross-sectional studies.



E = expenditure on aided services

G = amount of conditional grant

g = local matching rate; the amount of local money required to obtain one dollar of grant money

Figure 3. Range of Response of Local Expenditures to Matching and Non-Matching Conditional Grants.

a limited stimulation. When the coefficient is greater than $1 + g$, then the grant is said to be complementary, or have a super-stimulative effect.

Suppose, for example, a locality received a grant requiring that local funds underwrite 25 percent of the cost of a program. g , therefore, equals $25/75$ or $.33$. The grant super-stimulates expenditures if its coefficient is greater than $1 + g$, or 1.33 . It only has limited stimulation if the coefficient is less than 1.33 .

Interpreting the coefficient on an unconditional grant variable is considerably simpler. The partial derivative, $\frac{\partial E}{\partial G}$, represents the government's marginal propensity to spend unconditional grants on a particular good. No true notion of stimulation or substitution exists unless we are talking about public goods in the aggregate. In that case, the unconditional grant may reduce taxes, a type of substitution, or stimulate expenditures from own funds on public goods.

Gramlich, in an aside, also urged researchers to quantify the effect of conditional grants on the spending for goods other than the aided good in question. As noted before, the spending patterns for other goods rarely stay the same after a local government receives a grant for a particular good or service. These changes may have significant policy implications. A conditional grant earmarked for a public good, for example, might gut other programs or drastically increase tax payments.

Wilde's and Gramlich's articles became and are the standard references for the utility maximization theory on the expenditure effects of grants. Some theoretical pieces relying on the Constrained Maximization model followed and elaborated upon these seminal analyses. Wilde, in 1971, dovetailed the received theory on the expenditure effects of grants with the theory on the appropriate design of grants and concluded

that the preferences of the donor and recipient governments ran counter to one another. "The locality finds block (unconditional) grants preferable . . . to specific (conditional) non-matching aid, which is preferable . . . to the closed-ended specific matching aid, which in turn is preferable . . . to the open-ended specific matching grant" (Wilde, 1971, p. 146). In contrast, donor government would rank these grants in reverse order. Charles Waldauer used an indifference curve analysis "to examine the full range of possible differences in grant structures included open- versus closed-ended financing, and to focus attention on the differential influence of complementarity versus substitutability among aided and non-aided services" (Waldauer, 1973, p. 213). His findings, though more complete, were identical to Wilde's results.

Some authors modified Wilde's analysis by introducing "real world" distortions. Jon Rasmussen argued that a conditional, matching grant earmarked for only certain inputs may distort relative factor prices to the point where an unconditional non-matching grant of the same dollar amount as a conditional matching grant may induce a greater level of spending by the recipient government (Rasmussen, 1975). Martin McGuire, in two separate essays, criticized the Constrained Maximization model on the premise that "(the) acceptance of the nominal legal provisions of a grant as defining the actual and effective resource constraint faced by the grant receiver . . . is probably false" (McGuire, 1977, p. 1; McGuire, 1975). Because of the complexities of the grant formulas, local officials can "manipulate" the grant money, effectively transforming conditional grants into unconditional subsidies. Consequently, as McGuire asserted "an indirect statistical method is required to uncover the shape of the post subsidy budget line" (McGuire, 1977, pp. 1-2). Waldauer,

in a recent article, examined local government's response to grants in a dynamic model (Waldauer, 1977). He found, generally, that the open-ended financing of grants tends to cause expenditures to grow at an explosive rate while closed-ended financing tends to stabilize the growth path of expenditures.

Expenditure Effects of Grants: Median Voter Model

The central tenet of the Median Voter model, easily the most democratic view of government activity, is that the citizen-voter ultimately determine the budget choices of local governments. Rejecting the simple or cynical assumptions of the Constrained Maximization Model, the advocates of this framework see an invisible hand working in the town hall atmosphere of local governments. Citizens, concerned with their well being, reflect their preferences for public goods and tax prices through their choices for political candidates. Because the time and money cost of collecting information about candidates and the budget issues are minimal, most, if not all, citizens vote. Candidates face, as a result, a spectrum of voters with defined desires, who are knowledgeable about the politicians' stands on issues.

These candidates are motivated by their own desire to attain or remain in office. The pathway for satisfying this desire is to follow the preferences of voters -- to capture, in other words, a plurality of voters by a kind of platform differentiation. Theoreticians have argued that this political infighting is like the brisk competition between private firms (Johnson, 1976, p. 61). Barriers to entry are few. No bloc of voters (consumers) dominates. And instead of maximizing profits, political candidates attempt to maximize votes.

Bowen, Black, and, later, Tullock showed that under a system of majority rule where citizens' preferences for public goods were single peaked or normally distributed, the successful candidate would promise a tax and expenditure package approximating the package preferred by the median voter (Johnson, 1976, p. 61). While this framework can readily be incorporated into a Constrained Maximization framework by identifying the decision-maker as the median voter, most proponents have not opted to derive their expenditure equations from a utility function. The reasons for this are threefold: (1) because public goods may not be an element in the residents' utility functions; (2) because of the coercive power of the state to tax; and (3) because the effective budget constraint cannot be described (Johnson, 1976, p. 63). In addition, proponents have restricted their use of the median voter framework to single service local governments with fixed tax structures (e.g., school districts) and have assumed that the median voter residing in that government's boundaries is the voter with the median income.^{15/} Though under these assumptions the median income voter position would only tend to prevail, Borcharding and Deacon (1972), Bergstrom and Goodman (1973), Ladd (1975), and Feldstein (1975) argued that elected local officials, however imperfectly, translate the preferences of the median voter into public programs.

This theory was the foundation for theoretical analyses of the expenditure effects of grants. Bradford and Oates, in the first of two groundbreaking publications, examined the expenditure effects of conditional matching and unconditional non-matching grants under the

^{15/} Bergstrom and Goodman (1973) identified the necessary and sufficient conditions for the median voter-median income correspondence.

assumptions of a median voter framework (Bradford and Oates, 1971a; 1971b). Assuming a two good world -- one private good and one public good -- they reduce a typical community, at a given moment in time, to a vector containing the disposable incomes for all community members (the claims on private goods) and the number of units of the public good. In this hypothetical world, the relative prices between the two goods equal unity, and the "set of feasible states of the community" (that is, the possible disposition of public and private goods in the community) represents the budget constraint. Given some initial "feasible state of the community," the political process transforms this state into a new equilibrium state, simultaneously determining the level of disposable incomes and the output of the public good. A grant is assumed to disturb a given equilibrium state, resulting, probably, in a change in incomes and output.

For analytical usefulness, Bradford and Oates ask whether a grant to a community could elicit the same level and pattern of incomes and public goods that a direct subsidy to the individual community members would. This, they concluded, depended on the characteristics of the political process. Looking at the specific case where tax shares were known and fixed, and decisions were made by majority rule (the median voter model), they found that unconditional non-matching and conditional matching grants distributed to either the community as a whole or to the individual residents caused the same shift in spending. In addition, they found "that the median of the most preferred budgets will be smaller under a lump sum intergovernmental grant than with a matching grant program of the same amount" (Bradford and Oates, 197a, p. 447). This latter result paralleled the findings of the Constrained Maximization Model.

Bradford and Oates' studies were restrictive partial equilibrium analyses founded, in part, on the assumptions of a single public good and fixed tax shares. Heins and Goetz and McKnew relaxed these assumptions and showed that the comparative effects of the two types of grants might differ from those predicted in the Bradford and Oates' study (Heins, 1971; Goetz and McKnew, 1972). Heins, unlike most authors, considered the effect of a donor government collecting taxes from individuals in a community to finance an unconditional non-matching grant program. He posited a community with three individuals: one poor, one with an average level of income, and one rich. Each pays taxes to the local government in proportion to his/her income level. The total tax payments exactly cover the cost of providing the pure public good by the local government so that none of the three individuals has an excess demand for the good at the tax-price he/she pays. Should the donor government impose a progressive tax and then return the tax money in the form of an unconditional grant, income would be transferred from the rich individual to the poor individual. The poor individual's demand curve for the good would shift upward resulting in a positive excess demand for the good at the existing tax price. In contrast, the rich individual would desire less of the public good at his/her existing tax price. Heins generalized that "when an individual pays more (less) taxes to the grantor under a fully-funded grant program than he pays to the grantee for equivalent services, the algebraic value of his excess demand public services will be reduced (increased)" (Heins, 1971, p. 452). Expanding this result to an N community world, Heins concluded, "assuming an even distribution of excess demands among the rich and poor, the predicted effects would be for the flat grant to increase

public spending in poor communities and reduce it in wealthy communities, leaving average communities pretty much unchanged" (Heins, 1971, p. 453).^{16/}

Goetz and McKnew used a simplified Public Choice model, in which they assume three voters are allocating resources between two public and two private goods, to analyze the expenditure effects of conditional matching and unconditional non-matching grants. A conditional matching grant, unlike an unconditional non-matching grant, could shift the identity of the median voter in their analysis by changing the relative price ratios. They offer a numerical example showing that an unconditional non-matching grant could stimulate spending for the public goods by a larger amount than a conditional matching grant.

Expenditure Effects of Grants: Budget Maximization Model

An alternative to both the median voter and Constrained Maximization Models of tax and expenditure decision making was suggested by William Niskanen, former director of the Office of Management and Budget (Niskanen, 1971). Niskanen emphasized the role of the producers, specifically the influence of bureaucrats, in the decision process. He argued that the budget for any given agency was determined by the bureau-manager. Niskanen asserted that a bureau-manager's preferences were monotonically related to the size of the budget, and that the bureaucrat attempts to maximize the agency budget subject to the constraints that either the value of output equals the cost of producing it, or that the marginal value of output exceeds zero. As Johnson

^{16/} Heins did further analyses relaxing the assumption of the even distribution of excess demands and showed that an unconditional grant could induce an incredible range of expenditure responses, from reducing spending to increasing spending.

pointed out, "Unlike constrained maximization or even median voter theories, the Budget Maximization Model implies that decisions are made by equating average (rather than marginal) social valuations and costs" (Johnson, 1975, p. 16). The central feature of the Niskanen model, thus, is that bureaucrats act as discriminating monopolists in providing public goods.

The model has been incorporated, mainly, into theoretical works. Martin McGuire, in 1971, addressed the question of whether output or performance subsidies were "demonstrably superior to a cost subsidy as a tool for influencing the behavior of a local government" (McGuire, 1971, p. 14). Assuming a utility maximization model of fiscal decision-making, McGuire found that performance grants were cheaper than cost subsidies if the government produced the good at declining average cost, were as costly if the good was produced at constant average cost, and were more costly if the good was produced at increasing average cost. More importantly, McGuire found that neither grant was superior if government officials acted as budget maximizers.

McGuire, in a later work, found much the same result when he compared the expenditure effects of unconditional non-matching grants, conditional matching grants with open-ended financing, and conditional matching grants with closed-ended financing under the alternative models (McGuire, 1973). For each of these grant types, "a budget or output maximizing bureaucracy will spend the entire grant in the public sector, and then exploit the increased consumer surplus in the form of still greater output"^{17/} (McGuire, 1973, p. 209). In contrast to the predictions of the utility

^{17/} Vickery has an excellent discussion of the indifference curve analysis of consumer surplus (Vickery, 1964, pp. 66-76).

maximization theory, McGuire's analysis suggests that these three grants, if of equal amount, induce the same spending response.

Wilde, recently, elaborated on the McGuire study and compared the predicted effects of selected grant types within the Niskanen framework (Wilde, 1977). The Wilde analysis differed from McGuire's analysis in two ways: (1) Wilde examined the demand and cost curves for public goods in contrast to McGuire's use of indifference curve analysis, and (2) Wilde viewed the grants as cost subsidies unlike McGuire, who viewed them as demand shifters.

Figure 4 illustrates the hypothetical response of a local government to the four types of grants. The horizontal axis measures the quantity of an aided good (mental health services) produced in some time period, and the vertical axis is measured in dollars. In Figure 4A, the essentials of the Niskanen framework are graphically described. As discussed before, Niskanen argued that the bureaucrat (1) controlled budget decisions, (2) acted as a discriminating monopolist with the ability to capture consumer surplus, and (3) was constrained in his desire for bigger budgets to equate average cost to average revenue or to ensure that the marginal value of output exceed zero. The diagram shows examples of a bureaucrat's behavior under either constraint. If the community's demand for public goods is described by the line DD, then the bureaucrat could exact, what Niskanen calls, a "fat budget." Since the bureaucrat is a discriminating monopolist, the demand curve DD is transformed into a marginal revenue curve. The corresponding average revenue curve is given by AR. The average cost curve (AC) intersects the average revenue line (AR) at output Q^* to the right of D (the point where DD meets the quantity axis). In this instance, the bureaucrat would produce D units of output since

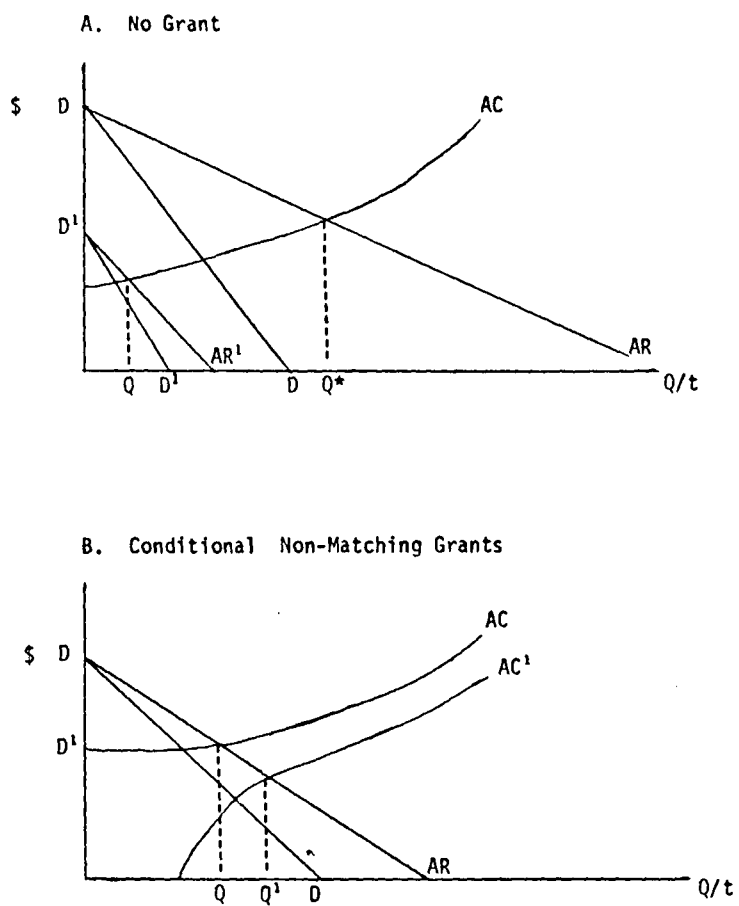
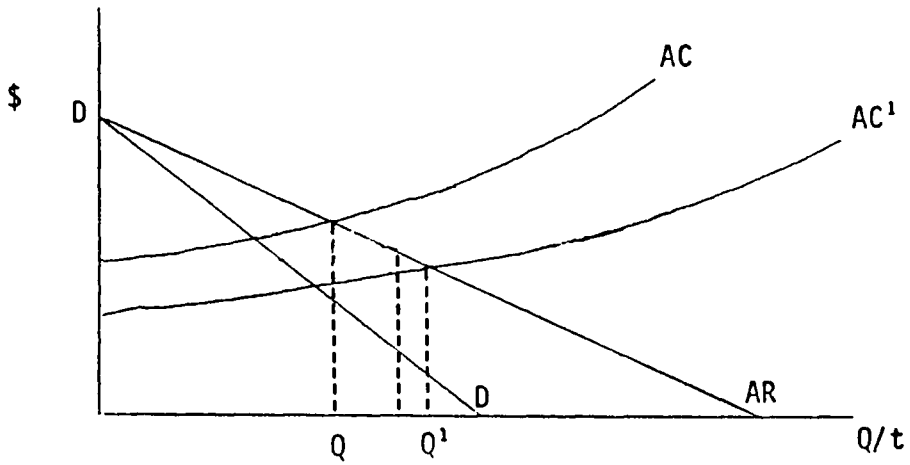


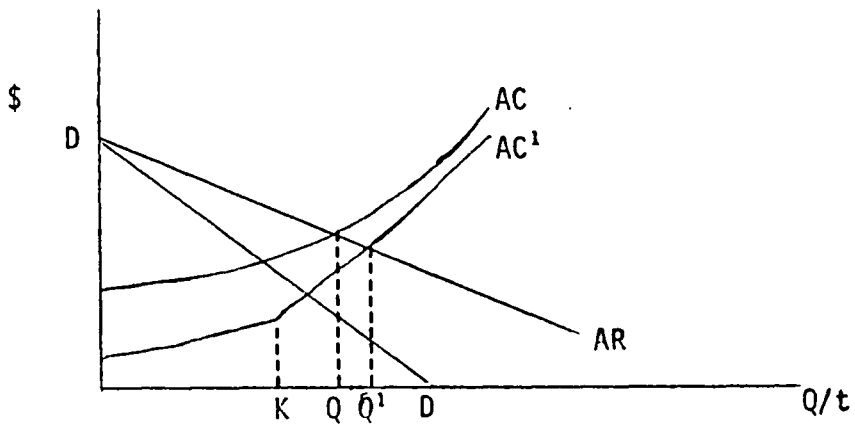
Figure 4: Expenditure Effects of Selected Grants: Budget Maximization Model.

Figure 4 cont.

C. Open-ended Conditional Matching Grants



D. Closed-ended Conditional Matching Grants



this is the maximum appropriation available. In comparison, the no-fat (low demand) case is represented by the intersection of AC and AR^1 (Q units of output) in this diagram.

Should the local government receive a conditional non-matching grant, the average cost curve for the agency would shift from AC to AC^1 (Figure 4B). After the grant, the bureau would produce Q^1 units of the aided good. In this shift from Q to Q^1 , the bureaucrat manages to direct all increased revenue, including the grant, into programs for the aided service. Because of the bureaucrat's ability to capture consumer surplus, conditional non-matching grants stimulate spending for the designated program by more than one dollar amount of aid.

The Figure 4C, an open-ended conditional matching grant shifts the average cost curve, AC, to the new schedule, AC^1 . Again, the grant and the increased consumer surplus are extracted by the bureaucrat in increased output (Q^1). Figure 4D illustrates a similar reaction to closed-ended conditional matching grants. These different grants could induce different responses in the Wilde analysis as compared to the McGuire analysis. An open-ended matching grant causes the new average cost curve AC^1 in Diagram 4C to diverge from AC. In Diagrams 4D (and 4B), the curves approach asymptotically. Hence, depending on the demand curves, the shape of the average cost curves, and the points of the equilibrium, each grant could induce a different spending and output response.

Moreover, Wilde argued that the response of a local government to an unconditional non-matching grant could not be predicted "since the funds could be sent to a governmental unit composed of many separate bureaucracies. Which bureaus would be able to obtain portions of these

funds cannot be determined" (Wilde, 1977, p. 9). Despite this, the framework does imply that an unconditional grant would stimulate expenditures for all public goods by more than the amount of the grant. Wilde also analyzed some variations on the Niskanen theme. The first is based on "the premise that bureaucrats seek to maximize their budgets but denies them power to capture consumer surplus" (Wilde, 1977, p. 10). Wilde's second variation on the Niskanen theme "removes monopolistic control from the bureaucracy and institutes cost-minimization and average cost pricing." For each, the effects of an unconditional non-matching grant could not be predicted. Beyond this point, the similarity ends. The average cost pricing scheme produced results quite similar to the Constrained Maximization Model. On the other hand, the first modification of the basic model produced results quite similar to the original Niskanen framework.^{18/}

Expenditure Effects of Grants: Summary

A comparison of the expenditure effects of different grant types under the Constrained Maximization and Budget Maximization models is provided in Table 2. While the table is self-explanatory, some generalizations should be made. If the Constrained Maximization Model described the real world of budgets, bureaucrats and voters, then: (1) in terms of their probable effects on the spending for a particular service, grant type 3 (open-ended conditional matching grants) is more stimulative than grant type 4, which is more stimulative than grant type 2, which in turn is more stimulative than grant type 1; (2) unconditional non-matching grants would never increase spending for a particular good by

^{18/} See Wilde (1977) for the analyses.

Table 2. Expenditure Effects of Selected Grant Types: Constrained Maximization and Budget Maximization Models

Aid Type \ Model Type	Constrained Maximization		Budget Maximization	
	Maximum Response	Minimum Response	Maximum Response	Minimum Response
1. Unconditional, non-matching grants	$\Delta E = aG$	$\Delta E = aG$?	?
2. Conditional, non-matching grants	$\Delta E = G$	$\Delta E = aG$	$\Delta E = b_2G$	$\Delta E = b_4G$
3. Open-ended, Conditional, Matching Grants	$\Delta E = G/M$	$\Delta E = b_1G$	$\Delta E = G/M$	$\Delta E = b_5G$
4. Closed-ended, Conditional, Matching Grants	$\Delta E = G/M^*$	$\Delta E = aG$	$\Delta E = G/M$	$\Delta E = b_4G$

G = Amount of grant.

E = Total spending on specified function.

ΔE = Change in total spending.

a = Marginal propensity to spend on aided function; $a < 1$

M = Matching rate.

$0 \leq b_1 \leq 1/M$

$b_2 \geq 1$; $b_2 = E/G$

$b_2 \geq b_4 \geq 1$

$b_5 > 1$ and $b_5 \leq 1/M$

* This is assuming that the ceiling for the grant is beyond the point of equilibrium for an open-ended grant of the same amount.

Adapted from Wilde, 1977

more than the amount of the grant and probably would not increase spending for all public goods by more than the amount of the grant. Some unconditional grant money would be diverted to tax relief; (3) conditional non-matching grants could never increase spending for the aided good by more than the amount of the grant; (4) open-ended conditional matching grants could increase spending for the aided good by more than the amount of the grant.

If, instead, Niskanen was right and bureaucracies dominated local budget proceedings: (1) the amount of unconditional grant money received by a particular program would be determined by the relative bargaining power of the agency head *vis-a-vis* other agency heads. In total, the local government would spend more than the amount of the grant for public goods. There would be no tax reduction; and (2) conditional grants would always stimulate spending for the aided good by more than the amount of the grant.

Though the models offer seemingly testable hypotheses about the expenditure effects of different grants, the legacy of the theoretical work lies in the analyses by Heins and Goetz and McKnew. Working under the assumptions of the median voter theory, each of these studies showed how little we know about the collective decision-making process. Heins showed the wide range of possible effects of unconditional non-matching grants simply by shifting the preferences of hypothetical citizens, at different income levels, for public goods. Much like Giffen, Goetz and McKnew offered a counter-example to the widely held view that conditional matching grants necessarily stimulate public expenditures by more than an unconditional grant.

The crux of the issue, as Oates was quoted earlier, is in our understanding of the political decision-making process. The empirical studies reviewed in the next chapter shed some light on whether the three models of fiscal decision-making adequately describe or explain local budget decisions. Despite this, there have been few direct comparisons of the models. These must and will come in future studies. Until then, we are left with insights gained from the quantitative estimates of the effect of grants.

CHAPTER III

REVIEW OF EMPIRICAL STUDIES

Overview

After reviewing the pre-1969 literature on the expenditure effects of federal grants, Edward Gramlich remarked that "(the) explosion in federal grants and grant programs is nothing compared to the explosion in the literature dealing with the effects of federal grants" (Gramlich, 1969a, p. 569). Gramlich's statement remains an apt, if oblique, warning to researchers. On the one hand, the researcher beginning a study of the fiscal effects of grants must be prepared to read, skim, or ignore a large number of monographs, theses and journal publications concerned with isolating the expenditure and output effects of federal and state grants. In 1974, for example, Fredland summarized over 80 studies of the determinants of public expenditures, most containing estimates of the effects of grants on local expenditures.

On the other hand, Gramlich was urging researchers to develop their estimating equations from a theoretical foundation. He was chiding the economists whose studies he reviewed for rushing into this publishable topic area after finding that grants "worked" in explaining the mix and level of spending by governments. His major criticism of these studies was that they lacked any rigorous conceptual framework. For the most part, the researchers regressed expenditures or expenditures per capita on per capita income, per capita grants-in-aid, and various taste and socio-economic variable. Though common sense, rather than theory, dictated the selection of explanatory variables, their research strongly suggested that grants were a positive and significant determinant of

spending. But, as Gramlich noted, the lack of a theory may have caused them to omit key variables, resulting in biased estimators and questionable estimates.

Gramlich's critical review signaled a turning point in the literature. Since then, researchers have become more concerned with theory-based research. What follows is a brief description of the theoretical approaches used in the more recent studies. Then, the empirical findings from these studies will be examined. Finally, the technical and conceptual flaws in these studies will be discussed.

Theoretical Approaches^{1/}

Of the studies reviewed in this Chapter, the research by Osman (1966), Smith (1968), and O'Brien (1971) are most characteristic of the "pragmatic empirical" analyses that predominated in the 1960's. These authors essentially used a statistical approach to uncover the relationship between government spending and socio-economic and demographic characteristics.

Another group of researchers stressed that variations in local government spending result from differences in the demand for public spending, either by an unidentified decision-maker or by the median voter (ACIR, 1977a, p. 47). Specifically, the preference structure was attributed to the community (Henderson, 1968; Gramlich, 1969; Johnson and Junk, 1970; Gramlich and Galper, 1973; Bahl and Pillai, 1976), to elected officials (Inman, 1971; Tresch, 1974; McGuire, 1977; Weber and Savage, 1977), or to the median voter (Borcherding and Deacon, 1972; Bergstrom and Goodman, 1973; Feldstein, 1975; Fitch and Godwin, 1976).

^{1/} For a more complete discussion of the theoretical models underlying some of the recent empirical works, see Appendix I.

These authors selected their explanatory variables with an eye to the theory of consumer demand. Generally, they included one or more proxies for the price of public goods, a per capita or per user income variable, aid variables, a proxy for the price of competing private goods, and various socio-economic variables in their regression equations. In some instances, the estimating equations were derived from specific functional forms with estimable parameters (Inman, 1971; Gramlich and Galper, 1973; Johnson, 1976).

The final set of studies reviewed in this chapter was concerned with the influence of supply forces in the market for public expenditures. Booms and Hu (1971) and Ohls and Wales (1972) offered simplified models of the demand for and supply of public spending. Borcharding and Deacon (1972) and Bergstrom and Goodman (1973) assumed that local governments produced goods according to a Cobb-Douglas production function. A fruitful new direction in research was introduced by Johnson (1976) and a research team for the Advisory Commission on Intergovernmental Relations (1977a, 1977b) when they asserted that public goods were produced with labor and capital inputs according to a fixed factor production function. Because labor serves as an ordinal measure of output under this assumption,^{2/} Johnson and the ACIR consultants expanded the notion of the fiscal effect of grants to include the effects of grants on labor and wage levels.^{3/}

^{2/} See Appendix III (No. 11) for an explanation of this phenomenon.

^{3/} Ehrenberg (1973), in fact, predated these studies. His concern, though, was strictly with the derived demand for public labor.

Empirical Results

Because of the great number of empirical studies, a tabular summary of findings was constructed (Table 3). The Table reports, among other details, the authors' estimates of the impact of grants. Not all studies have been summarized in Table 3.^{4/} In general, a study was included in the table if it typified research founded on a particular theory of fiscal decision-making, if it represented a theoretical or empirical breakthrough, or if it proved useful to this research. Also, none of the studies published before 1968, except one because of the controversy surrounding it, were summarized. Despite this discriminating selection process, generalizations about the expenditure and output effects of grants can be and are made.

The earliest study recorded in Table 3 was conducted by Osman (1966). Osman asked whether conditional federal aid had a "dual impact," stimulating expenditures for services not earmarked for the grant money as well as stimulating expenditures for the earmarked services. His findings supported the dual impact hypothesis. Conditional federal aid stimulated^{5/} state and local government spending for education (\$5.11), highways (\$1.37), welfare (\$1.38), health (\$2.09), as well as other services. Moreover, Osman found that grants stimulated spending for state and local services not directly financed by grants. A dollar grant earmarked for non-educational services, for example, induced a \$.52 increase in educational spending. His findings gained much play in the journals, touching off a controversy that will be discussed in an upcoming section.

^{4/} The reader is referred to Gramlich (1969a), ACIR (1977a), Johnson and Inman (1977) for more extensive reviews.

^{5/} Throughout the chapter, stimulation and substitution are used as defined by Gramlich.

Table 3. Expenditure and Output Effects of Grants: A Summary of Selected Results

	Publica- tion Date of Study	Unit of Analysis	Year	Data Set	Dependent Variables	Independent Variables	Estimation Method	Grant Impact Coefficient	Price Term for Open- ended Grant
1. Osman	1966	State and local govern- ments - 48 states	1960	Cross-section	Per capita expendi- tures for total edu- cation, schools, colleges, highways, Welfare, health, and all services com- bined	Federal aid to ser- vice; all other feder- al aid	O.L.S. Linear	All ser- vices 1.94 Education 5.11 (other aid es- timate) .52 Highways 1.57 (other aid) .3 Welfare 1.38 Health 2.09 Colleges 2.59 Schools 2.71	----
2. Henderson	1968	100 metropo- litan counties and local go- vernments; 2,980 non-metro- politan counties	1957	Cross-section	Per capita total ex- penditures; per ca- pita taxes	Per capita state and federal aid	O.L.S. for expenditure equation; 2SLS for tax equa- tion	Expenditures: metro 1.42 non- metro 1.04 Taxes: metro .38 non- metro .056	----
3. Smith	1968	State and local governments - 50 states	1965	Cross-section	Per capita own ex- penditures for com- bined services, highways, Welfare, education, health, non-aided services	Per capita federal aid	O.L.S.: Linear and log-linear	Combined (log- linear) .66 Highways .12 .17 .20 Education .0 .0 Health -1.29 -.21 Non-aided goods .59	----
4. Gramlich	1968	State and local governments - 50 states	1954- 1965; quarterly observa- tions	Time Series	Expenditures	Conditional matching aid; conditional, non- matching aid; uncon- ditional aid	2SLS	Matching 1.12 Non- matching .55 uncondi- tional .28	Legal matching rate

Table 3. Expenditure and Output Effects of Grants: A Summary of Selected Results (continued)

	Publica- tion Date of Study	Unit of Analysis	Year	Data Set	Dependent Variables	Independent Variables	Estimation Method	Grant Impact Coefficient	Price Term for Open- ended Grant
5. Johnson & Junk	1970	43 largest U.S. cities	1967	Cross-section	Per capita expenditures	Per capita grants	3SLS	2.02	----
6. Inman	1971	41 cities	1967	Cross-section	Expenditures	Unconditional aid; open-ended-matching aid	2SLS	Unconditional matching 1.34 more stimulative	Effective matching rate
7. Booms & Hu	1971	State and local governments - 50 states and Washington, D.C.	1960	Cross-section	Per capita expenditures	Per capita federal grants	2SLS	1.68	----
8. O'Brien	1971	State and local governments - 48 states	1958-1966	Pooled	Per capita own expenditures for combined services, education, highways, health, welfare, and combined other services	Per capita grants to function; per capita grants to all other services; per capita total aid	O.L.S.; 2SLS GLS	Deflated GLS estimates for: Combined Health (other aid) Education (other aid) .19 -.27 0.025 .67 .18	----
9. Ohls & Wales	1972	State and local governments - 48 states	1968	Cross-section	Per capita expenditures for combined services and highways; per pupil expenditures for education	Per capita federal aid	O.L.S.; log-linear	Combined Education Highways .29 .25 .57	----
10A Gramlich & Galper	1973	State and local governments - 50 states	1954-1972; quarterly observation	Time Series	Per capita current own expenditures	Open-ended matching aid; per capita closed-ended matching aid; per capita unconditional aid	O.L.S.; Stacking technique first difference	Unconditional Conditional Conditional .13 .80	Effective matching rate
10B Gramlich & Galper	1973	10 U.S. cities	1962-1970	Pooled	Per capita own expenditures for combined services, education, public safety, social services, and urban support services	Open-ended matching aid; per capita closed-ended matching aid; per capita unconditional aid	O.L.S.; Stacking technique first difference	Unconditional Closed-ended social education Open ended 2/ social services public works .25 .58 .54 -.74 -.92	Effective matching rate

Table 3. Expenditure and Output Effects of Grants: A Summary of Selected Results (continued)

	Publica- tion Date of Study	Unit of Analysis	Year	Data Set	Dependent Variables	Independent Variables	Estimation Method	Grant Impact Coefficient	Price Term For Open- ended Grant
11. Ehrenberg	1973	State and lo- cal governments- 50 states	1958- 1969	Pooled	Per capita total employment budget	Per capita grants	1st stage of 3SLS; log-linear	.222	----
12. Feldstein	1975	105 Massachu- setts towns	1965 and 1970	Cross-section and pooled	Current educational expenditures per pupil	Open-ended matching aid; per pupil state non-matching aid; per pupil federal non- matching	O.L.S.; log- linear; 8 separate re- gressions with different specifications	O.L.S. 1970: open- ended ^{2/} -1.0 state aid .066 federal aid .136	One minus matching rate
13. Ladd	1975	78 communities in Boston SMSA	1970	Cross-section	Education expen- ditures per pupil	Open-ended matching aid; per pupil state non-matching aid; per pupil federal non- matching aid	O.L.S.; log-linear 3 separate regressions with dif- ferent spe- cifications	Open- ended ^{2/} -.65 state aid .034 federal aid .106	One over one plus matching rate times residential fraction of property tax base
14. Bahl & Pillai	1976	17 Indian states	1970- 1971	Cross-section	Per capita expen- ditures (rupees) for combined ser- vices and develop- mental services	Per capita total aid; per capita shared taxes; per capita unconditional aid	2SLS	Combined: total aid 4.25 shared taxes 4.68 uncondi- tional aid 2.25 Development: total aid 2.74	----
15. Fitch & Godwin	1976	Oregon county and local go- vernments	1962, 1967	Pooled	Per capita current expenditures, per capita taxes, per capita capital ex- penditures for com- bined services, ed- ucation, roads, po- lice, sanitary, parks, and Welfare	Per capita conditional grants; per capita un- conditional grants; per capita all other grants	2SLS	Combined: <u>Unconditional</u> Total .526 Capital .405 Taxes -.157 <u>Conditional</u> Total .159 Capital .568 Taxes -.406 <u>Other grants</u> Total .357 Capital .048 Taxes -.551	----

Table 3. Expenditure and Output Effects of Grants: A Summary of Selected Results (continued)

	Publica- tion Date of Study	Unit of Analysis	Year	Data Set	Dependent Variables	Independent Variables	Estimation Method	Grant Impact Coefficient	Price Term for Open- ended Grant
16. Weber & Savage	1977	24 Oregon Coun- ties	1975- 1976	Cross-section	Per capita current expenditures for Mental health ser- vices	Per capita mental health grants; price term for mental health grants	O.L.S.	Grants Price 1.25 0	Effective matching rate
17. ACIR	1977	State and lo- cal govern- ments - 50 states	1972	Cross-section	Average annual earnings; full time employees per 1,000 population	Per capita federal pro- ject aid, formula aid; high-matching, low- matching and no- matching aid	O.L.S.	Total Expen- diture Impact: Project 1.92 Formula 1.34 High- matching 13.34 Low- matching 1.20 no- matching 1.59	----
18. ACIR	1977	local govern- ments - 6 states	1972	Cross-section	Average annual earnings; full time employees per 1,000 population	Per capita state aid, federal aid	O.L.S.	Oregon Results: State 1.28 Federal .24	----

¹ Gramlich defined this as discretionary expenditures; all locally generated revenue aside from that required to match against grant money.

² Price elasticity

Notation: O.L.S. = Ordinary Least Squares; 2SLS = Two-stage least squares; 3SLS = Three-stage least squares; GLS = Generalized least squares.

Smith (1968) rephrased Osman's dual impact hypothesis and tested the hypothesis that grants-in-aid "distorted" the state and local spending for services not earmarked for direct federal support. Using log-linear and linear specifications for the regression equation, Smith found that conditional federal aid stimulated state and local government spending for all services combined, for highway programs, and for welfare programs. Smith's results also suggested that conditional aid had a positive and significant influence on the spending for non-aided services. This evidence supported his "distortion" hypothesis.

Gramlich, in 1968, examined the relationship between different grant instruments and state and local government spending. From a sample of all state and local governments, Gramlich derived coefficient estimates for matching grants (1.12), conditional non-matching grants (.55) and unconditional grants (.28).

In the same year that Gramlich's research was published, Henderson (1968) published a study of the expenditure effects of grants on county spending. Henderson asserted that county officials determined tax and expenditure packages as if they were "maximizing a social welfare function subject to a community budget constraint" (Henderson, 1968, p. 156). Henderson's results indicate that grants stimulated county spending. Specifically, an additional dollar of state and federal aid induced a \$1.42 increase in metropolitan county spending of a \$1.04 increase in non-metropolitan county spending.

Johnson and Junk (1970), modifying the model developed by Henderson, tested the hypothesis that different sources of tax revenues differentially affected city spending. For a sample of 43 U.S. cities, they found that different tax instruments did induce different spending patterns. Grants,

in addition, were found to stimulate city expenditure (\$2.02). Though it is not reported in Table 3, Johnson and Junk reported that a dollar change in grants induced a forty-five cent change in city debt and reduced private expenditures by fifty-seven cents.

In a thoughtfully developed study, Inman (1971) derived expenditure equations for 13 services provided by 41 U.S. cities. Inman asserted that the observed budget allocations for cities were the result of utility maximizing behavior. He asserted further that the decision maker's preference function was multiplicative (the so-called Stone-Geary function) with parameters indicating the minimum level of expenditures for services necessary for positive utility. In modeling the city's budget constraints, Inman distinguished between conditional matching grants and unconditional grants. Inman's results indicate that (1) as hypothesized in Wilde's analysis, conditional matching grants generally increased city spending for services by more than unconditional grants, (2) the increase in spending for aided services depended on the minimum level of service desired by the community, and (3) an additional dollar of unconditional grant-in-aid generated a \$1.34 increase in spending while an additional dollar of per capita community income stimulated a \$.04 increase in spending.

Booms and Hu (1971) and O'Brien (1971), in cross-sectional studies of state and local government spending, reported results suggesting that grants generally stimulated expenditures. O'Brien's analysis, in particular, was quite extensive. Using three estimation methods (ordinary, two-stage, and generalized least squares) and undeflated and price deflated data, O'Brien found that grants stimulated state and local government spending from own funds on all services combined (.19)

and for education services (.67). Moreover, O'Brien found that federal grants caused a significant reduction in state and local spending from own funds on unaided or little-aided functions.

Ohls and Wales (1972) reported mixed results about state government response to federal aid. Federal aid stimulated state spending for highway construction and maintenance but substituted for tax dollars previously spent for education and total government services.

Gramlich and Galper (1973), in a sophisticated analysis, examined the impact of conditional non-matching grants, unconditional grants, and open-ended conditional matching grants on both state and local government spending and big city spending. In their time series analysis of state and local government spending, they found that a dollar of unconditional aid increased total expenditures by \$.43 (lowering taxes by \$.57) and that a dollar of conditional non-matching aid increased total spending by \$.80. Open-ended matching grants, entered as price variables in the estimating equations, were found to have no substitution effects.

In their analysis of city spending, Gramlich and Galper regressed the same set of explanatory variables on the spending for broad categories of programs (such as "Social Services") as well as the spending for all programs combined. Their regression results indicate that a dollar of unconditional aid increased total spending by \$.25. A dollar of unconditional non-matching aid was found to stimulate \$.54 and \$.58 in additional spending for education and social services. In contrast, Gramlich and Galper found that a dollar of non-matching aid earmarked for "urban support" services reduced local city spending by \$.28. Open-ended matching grants, again entered as price variables, stimulated spending on these three programs by about \$.80.

Gramlich and Galper selected cities for their analysis that were served "by one general government during the estimation period" (Gramlich and Galper, 1973, p. 38). They argued that it was "difficult to examine the behavior of one government in isolation, because it depends crucially on what all the other local governments serving the same geographic area are doing or have done in the past" (Gramlich and Galper, 1973, p. 38). Two researchers studied this question of overlapping jurisdictions. Waldauer (1970), in a cross-sectional study of the spending patterns of towns and villages surrounding Syracuse, tested the hypothesis that aid to the Syracuse city government affected the amount of public spending in the neighboring towns and villages. His estimates supported this hypothesis. Weicher (1972) published similar findings in a study of 121 SMSA's.

Several studies have been concerned with the impact of grants on spending by school districts. Ladd (1975), in a cross-sectional analysis of 78 communities in the Boston SMSA, showed that unconditional grants to school districts stimulated an additional \$.50 in spending. Ladd also reported that an additional dollar of conditional non-matching aid induced a \$1.10 response in spending. Feldstein (1975), using cross-sectional data from schools in 105 Massachusetts towns, reported stable price elasticities for open-ended matching aid, ranging from -.9 to -1.6. His results also suggested that unconditional state aid had a marginal expenditure impact of \$0.60 and that conditional non-matching aid was fractionally stimulative.

McGuire, at a later date (1977), tested whether school officials, during the period 1964-1971, had the ability to transform conditional aid into unconditional monies that could, essentially, be used for any

service. McGuire concluded about his findings that "local bureaucracies over the course of time have become . . . proficient at circumventing any conditions or restrictions on education grants, progressively finding better ways to treat contingent grants as revenue supplements" (McGuire, 1977, pp. 16-17).

Bahl and Pillai (1976), for a sample of 17 Indian states, analyzed the effect of total aid, shared taxes, and unconditional grants on local government spending. They reported that these aid instrument stimulated local spending, ranging from a 2.25 rupee increase in spending from a rupee of total aid to a 5.68 rupee increase from shared taxes.

Fitch and Godwin (1976) similarly tested for the differential impact of conditional and unconditional grants on local government spending in Oregon. Their results indicated that the unconditional grant money increased total spending by a greater amount than conditional grants and that both types of grants raised local taxes. They also found that revenue sharing grants were used primarily for capital expenditures and that the other unconditional grants financed the same services -- roads and education -- that the conditional grants supported.

Two other studies were concerned, specifically, with the response of state and local governments to conditional matching grants. Miller (1976) argued that the ABC Highway program, a matching grant program, did not appreciably affect the state's spending on highway programs. He found that all but 9 of the states spent as much as the matching requirement in the absence of the grant. Weber and Savage (1977), using the McGuire framework, tested whether the mental health grants received by Oregon county governments acted as budget supplements or changed the effective price for mental health services. After a series of tests, they concluded

that the grants acted as budget supplements, stimulating county spending for mental health grants by \$1.25.

Ehrenberg (1973), in a study of state and local governments' demand for labor, showed that grants significantly affected the total employment budget for these governments. Ehrenberg's estimate of the elasticity of the employment budget with respect to grants (.222) was derived in the first stage of a three-stage least square estimation procedure, that culminated in an equation explaining the number of full-time state and local government employees working in different program areas (e.g., police). Though it was not derived in the study, the elasticity of labor with respect to grants can be calculated.^{6/} For selected services, these calculated elasticities are: (1) education .15, (2) highway .1, (3) welfare .35, (4) police .18, and (5) fire .19. If Ehrenberg's estimate of the effect of grants on the total employment budget is representative of the effect of grants on the employment budget for the individual services, then his results suggest that for most services grants were directed into the hiring of new employees and not into increased salaries.^{7/}

^{6/} Ehrenberg specified a log-linear form for his equations. Accordingly,

$$\frac{\partial \omega L}{\partial G} \frac{G}{\omega L} \cdot \frac{\partial L}{\partial \omega L} \frac{\omega L}{L} = \frac{\partial L}{\partial G} \frac{G}{L}$$

where ωL = Total wage bill, L = Full-time employees, and G = Grants-in-aid.

^{7/} Inman (1977, p. 56), using results from his dissertation and from Ehrenberg's study, provided estimates for the elasticity of wages with respect to grants that suggest the grants might be directed into higher wages. If the employment budget is a constant share of total expenditure, then:

$$\omega L = \phi E$$

and $\phi dE = L d\omega + \omega dL$ Where E = Expenditures, L = Labor, ω = Wage

Since $d\omega = \frac{d\omega}{dz} \cdot \frac{z}{\omega} \cdot \frac{\omega}{z} dz$ Where z = grants-in-aid

$$\text{and } dL = \frac{dL}{dz} \cdot \frac{z}{L} \cdot \frac{L}{z} \cdot dz$$

(continued)

A research team for the ACIR (1977 a,b) developed a "public employment" framework to study the question of the fiscal effects of grants. Rather than regressing grants and the other explanatory variables on some form of expenditures, they regressed the independent variables on the number of full-time equivalent staff and the average salary level. These employment and wage responses were combined to derive the expenditure response of state and local governments to the different federal grants. Because of a strong employment response (full-time equivalent staff increased as the level of grants increased), the different grant instruments were found to stimulate expenditures.^{8/} Ranking the grant instruments by their expenditure effect: (1) high matching grants had the greatest effect (\$13.34), then (2) project grants (\$1.92), (3) non-matching grants (\$1.39), (4) formula grants (\$1.34), and (5) low-matching grants (\$1.20). The ACIR consultants also studied the effects of federal and

7/ (continued)

$$\begin{aligned}\phi dE &= L \left(\frac{d\omega}{dz} \cdot \frac{z}{\omega} \cdot \frac{\omega}{z} \right) dz + \omega \left(\frac{dL}{dz} \cdot \frac{z}{L} \cdot \frac{L}{z} \right) dz \\ &= \frac{L\omega}{z} (\epsilon_{\omega,z}) dz + \frac{L\omega}{z} (\epsilon_{L,z}) dz \\ dE &= \frac{E}{z} (\epsilon_{\omega,z}) dz + \frac{E}{z} (\epsilon_{L,z}) dz\end{aligned}$$

Since $\text{Log } \omega L = \text{Log } \omega + \text{Log } L$

then $\epsilon_{\omega L,z} = \epsilon_{\omega,z} + \epsilon_{L,z}$

$$\text{and } dE = \frac{E}{z} (\epsilon_{\omega L,z} = \epsilon_{L,z}) dz + \frac{E}{z} (\epsilon_{L,z}) dz$$

Inman argued that for a big city, E/z was approximately 1.4. Inman's estimate $\epsilon_{\omega L,z}$ for education was .71 and Ehrenberg's estimate $\epsilon_{L,z}$ for education was .16. Taking Δz as \$1., then:

$$\begin{aligned}dE &= 1.4 (.55)1 + 1.4 (.16)1 \\ &= .77 + .22\end{aligned}$$

In all, some 77 cents of the dollar change in grants went to increased wages.

^{8/} In addition, high and no-matching grants were related to lower wage rates, while low matching grants were related to high wage rates. The different grants had different employment effects.

state aids on local government spending in six states.^{9/} Generally, their estimates indicate that the grants did not stimulate wages as much as employment. The only state in which this result did not hold was in Kentucky, where a per capita dollar of state aid stimulated the annual average salary of public employees by \$1.44. Their results for Oregon indicate that state grants stimulated local spending by \$1.28 and that federal grants stimulated spending by \$.24.

Summary of Results

The findings from the major studies, while limited in scope, offer some insights into what we know and do not know about the fiscal effects of grants:

1. States, counties, and cities that receive a comparatively greater amount of state and federal aid tend to spend more on public services. With rare exceptions, the grant coefficients have been positive and significant.
2. Generally, total aid tends to stimulate total spending for state and local governments (i.e., $\frac{\partial E}{\partial G} > 1$). Conditional matching aid was, in most studies, found to stimulate expenditures. No apparent conclusion, it appears, can be drawn about the magnitude of the sign for the conditional non-matching and unconditional grant coefficients. This neither confirms nor rejects the predictions of the Constrained Maximization and Budget Maximization Models.

^{9/} The six states were: New York, Illinois, Oregon, Kentucky, Vermont, and Virginia.

3. The results summarized in Table 3, in general, support the hypothesis suggested by the Constrained Maximization Model that conditional matching grants stimulate spending by more than conditional non-matching grants which in turn stimulate spending by more than unconditional non-matching grants.
4. The ACIR's estimates suggest that federal project and formula aid stimulate state and local government spending and that project aid has a greater stimulus than formula aid.
5. For health and hospital services, the category of services most related to mental health services, the results published in different studies were contradictory. Osman's results indicate that total aid stimulated spending on this category of services. Smith's and O'Brien's published results suggest that total aid reduced spending for these services. Gramlich and Galper, in turn, reported that conditional non-matching aid generally substituted for tax dollars previously spent on health and hospital services. They also showed that open-ended conditional matching aid, measured as a price variable, was price inelastic. That is, the percent change in spending was less and in the opposite direction than the percent change in the matching rate.
6. The research by Henderson (1968) and Fitch and Godwin (1976) suggests that grants tend to raise taxes. Contradictory results have been reported about the effects of grants on non-aided services.

7. Aid to one local government tends to increase total spending by neighboring jurisdictions.
8. The research by McGuire (1977) suggests that local officials have the ability to circumvent the legal conditions attached to grants, shifting aid earmarked for a particular services to other services.
9. The tentative evidence from research by Ehrenberg (1973) and the ACIR consultants (1977a, b) implies that grants are funneled into the hiring of new employees and, to a lesser extent, into salary increases. In addition, ACIR found that different grants had different employment effects.
10. There has been little research on the output effects of grants-in-aid.

While there are some points of consensus, it appears that grants are not that stable and predictable a policy instrument. Much research remains to be done before aid transfers become a "fine-tuning" policy instrument. This lack of consensus, particularly about the magnitude of the effects of grants, may be explained by the econometric flaws in past studies. These problems, to which we now turn, may have led to biased estimates and possible misinterpretation of the results.

Technical and Conceptual Problems

Every few years, for the past fifteen years, some economic scholar has critically reviewed the literature on the fiscal effects of grants (Morss, 1966; Gramlich, 1969; Seigel, 1970; Johnson, 1976; Wilde, 1977;

Inman, 1977). These reviews have had strikingly similar themes. As Wilde remarked, it's as if researchers have to be given periodic "reminders" (Wilde, 1977, p. 13). The critics' reservations about the conceptual or statistical make-up of the grant analyses they reviewed roughly fall under several headings: (1) the misspecification of the aid variables, (2) the use of aggregated data, and (3) the omission of key explanatory variables or key relationships between explanatory variables. While these problems are most commonly encountered in the older studies, they have also cropped up in the more recent studies.

Misspecification of Aid Variables

In a majority of the studies summarized in Table 3, the various types of grants received by the local governments under study were combined into a "total aid" variable, or into the generalized terms state and federal aid. Because of this aggregation, there was a loss of information about the unique price, income, or cost effects of the different grant structures suggested by the theory and previous empirical research. Moreover, it is questionable whether the estimates of the effect of total aid are useful for policy purposes. Since total aid received by a government during a given time period is made up of a particular mix of conditional and unconditional aid, the marginal effect of the aid is the weighted average of a particular set of price, income, and cost effects (Inman, 1977, p. 7). The parameter estimates for the total aid terms are useful for prediction, then, only if this weighted average remains unchanged after a change in the amount of aid received. It is likely that the weights would change, making the total aid estimates inappropriate for policy.

Another probable error in past studies was the misspecifications of the variable for open-ended conditional matching grants. When these kinds of grants were not lumped with other grants into a single variable, they were commonly treated as income supplements. As Gramlich correctly suggested, though, open-ended conditional matching grants change the relevant price for a public service. Consequently, some form of the matching rate should have been entered as a variable.

Critics have also had misgivings about the published grant estimates because of the possible existence of a simultaneous equation bias involving the conditional matching aid variables. Oates first discussed this issue when he countered Osman's findings about the "dual impact" of grants (Oates, 1968). He argued that (1) "Osman's independent variable, aid received, is obviously a function of his dependent variable, the level of spending on a particular function" due to the matching provisions attached to grants (Oates, 1968, p. 221), and (2) that "since federal funds are a component of expenditures, one is to some extent regressing aid on itself, and as a result, the explanatory power of the aid variable is greatly exaggerated" (1968, p. 222). Pogue and Sgontz (1968) provided evidence for Oates' first assertion when they regressed per capita federal aid on the same explanatory variables hypothesized to influence state and local government expenditures and found that the amount of aid received by the governments was largely explained by these factors. They concluded that "the regression coefficient for federal aid in (a linear) expenditure equation . . . will be a biased estimate of the change in expenditures which will result from a unit change in federal aid" (1968, p. 199).

Osman (1968) responded to the articles, arguing that there was no simultaneity problem. Since most matching grant programs were closed-

ended, his argument ran, and since local governments exploited the available matching opportunities, then the amount of grants dispensed was exogenously determined. O'Brien (1971) substantiated Osman's claim. His results from ordinary, two-stage, and generalized least squares regressions indicated "that grants are not simultaneously determined" with expenditures (O'Brien, 1971, p. 65).

O'Brien's results, while strong evidence, are not the final word in this debate. There is, in Inman's words, a "new culprit"; matching grants offered on an application and approval basis. As Wilde stated, "(t)here may be no explicitly stated maximum amount in the program, and yet the donor in approving an application places a precise lid on his contribution. If grant approval is given for the full request, does this mean that the donor might not be interested in assisting an even more extensive project? When the application was made, did the potential recipient play grantsmanship in guessing what might be approved or scaled down?" (Wilde, 1977, p. 14). Thus, the analysis of application and approval grants is complicated by some previously omitted behavioral relationships; the government's grantsmanship ability, the preferences of the donor government as to the allocation of the grants; and the explicit competition among local governments for the grant money. The matching rate or the maximum grant ceiling for application grants may be endogenously determined by the same economic, social, and political factors that influence expenditure patterns.

Oates' second criticism of the Osman study, that aid is a component of expenditures, also, has been debated in the literature. Morss (1966) first discussed this problem in his review of the expenditure determinants' literature. He concluded that "little is to be gained from simply

regressing the dependent variable on itself or on parts of itself" (1966, p. 97). Oates, after criticizing Osman's research, advised that expenditures net of aid replace total expenditures as the relevant dependent variable in studies. His advice prompted Smith (1968) and O'Brien (1971) to use the reduced expenditure term.

Gramlich (1971) in a critique of O'Brien's study showed, however, that the estimate of the marginal effect of grants on expenditures net of aid would differ only by one from the coefficient in a regression where total expenditures was the dependent variable. In other words, an estimate of .2 in one regression would imply an estimate of 1.2 in the other regression. Gramlich's article placed the circularity debate into a new perspective. Depending on the purpose for a study -- whether prediction, understanding, or policy -- circularity may or may not be a problem. If, for example, a researcher is solely concerned with the parameter estimates on the aid variables, then either form of the dependent variable is acceptable.

The Use of Aggregated Data

Roy Bahl once commented that "not much practical mileage has been gained from the studies of the socio-economic determinants of aggregated per capita state and local government expenditures (Bahl, 1968, p. 554). Bahl was decrying both the aggregation of different units of governments and different public services into a single, catch-all, expenditure variable. Lumping such disparate units of governments as school districts, cities, and counties into a single unit of analysis is perhaps the more serious error of the two. Each jurisdiction has its own unique blend of historical, economic, and political factors that explain the

pattern of spending for that jurisdiction. It is asking quite a lot of researchers to explain successfully the variations in spending among jurisdictions that provide a common set of services. It is asking more to explain the variations in spending among dissimilar jurisdictions. Aggregated analyses are a dead-end in that we are gaining no new information about the unique institutional characteristics of schools or cities or about the response of the particular government to grants or other policy instruments.

This problem has been exacerbated, often, by the tendency of researchers to aggregate public services as well. Weicher and Emerine (1973) compared the results from individual and aggregated service regressions and showed that under certain conditions the explanatory variables could be significantly related to aggregated expenditures but not related to any of the individual service components. They concluded that the "aggregate regression . . . provides no information that is not already available in the individual regression. And it frequently misrepresents and distorts the results of the individual regressions . . . The results of aggregate expenditure regressions are basically useless" (Weicher and Emerine, 1973, p. 71, p. 82).

The Lack of Institutional and Political Realism

After 1969, applied economists became more concerned with the theoretical aspects of their grant-in-aid research. A conscious effort was made in their studies to set out a conceptual framework, to identify the interrelationships among variables, to generate hypotheses about the influence of key variables, and then to statistically test these hypotheses. The models that were developed, while a step in the right

direction, still had shortcomings; the inevitable result of modeling the complicated budget processes. Lingering problems exist in at least four areas: (1) the development of output measures for local public services, (2) the description of the production and cost functions, (3) the treatment of revenue sharing aid, and (4) the interrelationship of factor prices, the tax base, and the user population with local budget choices.

Output Measures

The absence of clearcut definitions of a unit of the various public services has limited the usefulness of the economic analyses of the public sector. While it is interesting and useful to explore the variations in expenditures or other proxies for output, our primary interest is in explaining the differences in service levels. Service levels and quality are, after all, the concern of citizens and policymakers. The potential problem with proxies is that they may not satisfactorily define output, resulting in biased estimates of the marginal effect of an independent variable.

This has been a distinct possibility in the expenditure analyses. Expenditures contain both a cost and a quantity component. Accordingly, expenditures could increase merely because of a cost increase. Indeed, if a service is provided by an increasing return to scale technology, then a rise in expenditures could be associated with a fall in real output (Inman, 1977, p. 37). Johnson argued that expenditures mirror output when the price of output is invariant over jurisdictions or when the price or cost differences across communities reflect differences in quality. Because a number of factors affect the real price for a public service -- such as grants, tax credits, and the cost of providing the

service -- the first condition is probably not an accurate description of local governments. The second condition, similarly, may not be realistic, since the employment bill, the major component of local costs, may not be perfectly correlated with productivity or quality.

Another proxy for output, full-time equivalent staff, has been used recently by Johnson (1976) and the ACIR consultants (1977 a, b). In contrast to expenditures, staffing is a satisfactory proxy if inputs are transformed into outputs according to a fixed-factor function, if labor is a homogeneous input (i.e., an aide is the same as a specialist) and if salary levels are unrelated to output levels. These assumptions are similarly open to criticism, though (Johnson, 1976).

In spite of the possible weaknesses in the assumptions, either measure could still be adequate. The output provided may not reflect the output desired. Or, local decision-makers may desire given levels of expenditures or staffing rather than the output of a public service. Accordingly, researchers must specify their reasons for using any measure.

The Provision of Public Goods

Richard Musgrave, in 1968, wrote that "while they (public goods) cannot be summarized as readily into market supply and demand functions as for the private good, the two blades of the scissors continue to exist" (Musgrave, 1968, p. 2). The foremost proponent of this viewpoint, Werner Hirsch, recently pointed out that both the production function and its economic counterpart, the cost function, are embedded in the output and expenditure decisions of local governments (Hirsch, 1977). Because of a prevailing demand orientation, supply questions have been

rarely addressed in the expenditure studies. Most authors have implicitly assumed that the price elasticity of supply of inputs is zero: that the price of inputs, and thus outputs in the models, is known and constant (Johnson, 1976, p. 29). This strong assumption allowed the researchers to fix supply conditions, so that the budget constraint alone could dictate the desired mix of public goods.

Some notable attempts have been made, though, to incorporate production and cost relationships into the traditional demand framework (Borcherding and Deacon, 1972; Bergstrom and Goodman, 1973; Ehrenberg, 1973; Johnson, 1976; ACIR, 1977a, b). Borcherding and Deacon and Bergstrom and Goodman assumed that the public services were produced according to a Cobb-Douglas production function. In contrast, the ACIR consultants assumed that public services were provided by a fixed-factor technology. None of the authors, however, tested these assumptions or estimated other functional relationships.

Moreover, in deriving cost equations from their assumed production functions, the authors assumed that public goods were produced at least cost (i.e., with an optimal mix of inputs given factor prices). Recent work done by Ahlbrandt on the public and private provision of fire services suggests that this may be a tenuous assumption (Ahlbrandt, 1974). Also, as Niskanen persuasively argued, the budget maximizing bureaucrat may have no incentive to product at least cost.

Another unresolved issue in the literature is whether publically provided goods are produced by a private good technology or not. Borcherding and Deacon and Bergstrom and Goodman provided some tentative answers to this question. They attempted to measure a congestability parameter for public goods, where goods vary in congestability from

complete non-rivalry in consumption to perfect packageability. This divisibility of service flow was expressed in the relationship:

$$(3) \quad Q_i = X_i / N^\delta$$

where X_i represents the flow of services from public good i , N equals the number of users of the service, and δ is the congestability parameter. If δ equals 0, then X_i is a pure public good. If δ equals 1, then X is a private good. Their results indicate that δ equaled 1 for most services.

Treatment of Revenue Sharing Aid

In all studies to date, federal revenue sharing aid has been treated as an unconditional non-matching grant or, in other words, as a pure income supplement. Yet, this form of aid may affect the price of public services due to interdependencies among communities (Johnson and Mohan, 1971). Because of tax effort provisions in the revenue sharing formula, revenue sharing grants could foster competition between communities to raise taxes and increase spending relative to one another. Greater tax effort in a community, ceteris paribus, results in a larger portion of the revenue sharing pie. Gramlich and Galper (1973) found that revenue sharing had a minimal price effect. However, their study was undertaken at a time when the revenue sharing program was comparatively small and local governments were uncertain if it was to be continued. Moreover, Reischauer (1975) rekindled the argument in a compelling analysis of the hidden incentives of the revenue sharing formula. Further research into the effects of revenue sharing is needed.

Simultaneous Determination of Key Explanatory Variables

Robert Inman, in his review, argued that the commonly used behavioral models of local fiscal choice were too restrictive, ignoring the local government's possible influence on, or command over, explanatory factors thought to be exogenous to budgeting (Inman, 1977, pp. 3-4). The result may have been biased estimates and misdirected policy. Specifically, Inman asserted that factor prices, the tax base and community income, and population are simultaneously determined with a local government's fiscal choice. Because Inman's discussion is quite extensive, a less than cursory outline of his main arguments is given. The reader is referred to Inman's essay for a more complete discussion (Inman, 1977, pp. 32-82).

An often used assumption in studies has been that prices of inputs were known and constant. The implication of this assumption is that wage decisions are made outside the budget process and are independent of the public employment choices. But, wages may change with adjustments in staffing levels for two reasons. Firstly, because of the increasing union activity among public employees, staff and wage levels may be jointly determined within the local budget process. Secondly, the labor supply schedule may not be perfectly elastic. If either of these events hold, then, in concert with the labor equation, an equation predicting wage levels should be included in a complete model.

In a similar vein, Inman and others have argued that the spending and budget choices made by local officials influence the location and investment decisions made by businesses and residents. The resulting changes in the housing and land markets could, in turn, affect spending and budget choices through adjustments in before-tax community income

and the government's tax base. This feedback was first suggested by Tiebout when he argued that residents "voted with their feet," moving to or staying in communities that provided a desired level of public services at a given tax price (Tiebout, 1956). The value or disvalue residents received from services and taxes were hypothesized to be capitalized into the value of housing. As land values and housing stocks change, the tax base changes -- resulting in a change in tax rates and the amount of tax revenue generated. The adjustments made by businesses are equally complex, involving capital investment decisions and location choices.^{10/} In spite of the complexity, these frameworks should be considered in the models of local fiscal choice.^{11/}

Another form of entry and exit has been discussed in the literature. Increasingly, local governments are forced to "compete" with private providers for client users. County mental health clinics, for example, are a part of a larger mental health service market that include psychiatrists, private agencies and institutions, and non-profit support groups as service providers. There are two interrelated, and unresolved, issues that have not been dealt with by researchers: (1) the resident's decision to consume public or private services, and (2) the effect of private provision and resident choices on public provision. The answers to each could have strong implications for the impact of grants.

^{10/} See Ladd, 1975, for an analysis of the effect of tax base composition on local spending.

^{11/} A further feedback effect may be that as public employees make up an increasingly larger share of a community's total employment, then community income could be simultaneously determined with expenditures.

Inman's final concern was about the role of the bureau in the determination of output decisions. He argued that "the role of the service bureau in the production of local public outputs, like the role of management in the production of private goods, has been largely neglected" (Inman, 1977, p. 48). Because of the bureau's potential control over the production technology and the labor skill mix, the service flow and the number of persons served by the bureau could be affected. This user-population could, in turn, affect the production of services in a mutual-feedback mechanism. This feedback and the control of the bureau's over production are issues worthy of research that have been rarely considered in past studies.

CHAPTER IV

RESEARCH DESIGN

Introduction

Like a latter day Procrustes, the researchers tends to mold the numerous facts about the fiscal choices made by local governments into a framework that borrows heavily from the theory of consumer demand and the theory of the firm. Accordingly, grants-in-aid have been viewed as income or price supplements that shift the budget constraint facing local decision makers. Public expenditure and output choices have been thought to be the end result of a preference maximization. And the choice of a particular input combination has been seen as the least cost response of the bureau suppliers to factor prices, a given production technology, and a cost-expenditure constraint. Robert Inman neatly summed up this tendency when he wrote,

"(W)hile the (traditional) fiscal demand model... can be easily embellished with the adjectives of politics, its main story remains an economic one. Local resource allocations are the choice of a single economic agent where only final goods and services can give satisfactions and one dollar, no matter how received or spent, offers the same benefits as any other. Outputs offer the only benefits and all money is fully fungible. Implicit in this economic framework are rather strong a priori restrictions on how the process of fiscal choice is run" (Inman, 1977, p. 32).

It was not until the last few years that researchers began straying from this strict economic paradigm. The traditional demand models have not been abandoned but modified with useful attempts at explaining the "forgotten elements" of grantsmanship, the role of the bureau, and the influence of unions.

While the economic model presented in this chapter departs little from traditional demand models, there has been an attempt to incorporate Inman's four "ingredients" for "(s)ound empirical analyses, (1) measures of public outputs, (2) specifications of the production technology, (3) a behavioral model of bureau decision-making on input allocations, technology selection, and output mixes, and (4) for the services where peer group effects are important determinants of output . . . , behavioral models of racial or income integration and private market utilization" (1977, pp. 69-70). The model, in particular, tries to flesh out the principal actors in the local government marketplace -- the community residents, the elected community officials, and the bureau employees; to describe their preferences for goods, wages, and tax burdens; to describe the cost, budget, and political constraints limiting the attainment of their preferences; and to describe how these groups of individuals come together to determine ultimately the tax, expenditure, and output choices for a jurisdiction.

The model and its accompanying estimating equations will be used to determine the effect of three types of mental health grants on the observed fiscal decisions made for Oregon counties during the 1975-1976 fiscal year.

An Overview of Mental Health Programs for Oregon Counties

By 1975, there were 31 county mental health programs serving the residents of all 36 Oregon counties. Seven eastern Oregon counties had joint programs: (1) Gilliam and Wheeler Counties, (2) Umatilla and Morrow Counties, and (3) Sherman, Hood River, and Wasco Counties. Crook County had just begun a county-run program at that time and was receiving staff assistance from Deschutes County.

The county-administered programs were and are part of a larger complex of public, quasi-public and private institutions offering care for the mentally and emotionally handicapped. The State Mental Health Division operates three hospitals in Salem, Wilsonville, and Pendleton. In addition, the Division is charged to "plan, obtain resources, develop standards, provide training and consultation, and regulate all mental health programs" receiving state money (1977, p. 2).^{1/} On the local level, private agencies complement the activities of the county clinics, often specializing in the care of patients with a particular problem such as alcoholism. The mix of services offered by a county department depends greatly on whether the services of these sub-contract agencies are available in a community.^{2/} Psychiatrists, psychologists, social workers and other counselors also offer private market alternatives to the state and county mental health programs. In addition, there are numerous private support groups such as the Oregon Mental Health Association, the Oregon Association for Retarded Citizens, and Alcoholics Anonymous providing services ranging from legislative advocacy to individual guidance. While this list is grossly incomplete and sketchy, it does suggest that Oregon citizens generally have access to a number of alternatives to the county mental health clinics.^{3/}

^{1/} There are, of course, other state agencies that offer services, but not direct institutional care, for the mentally ill. These include, for example, the Division of Vocational Rehabilitation.

^{2/} The term "sub-contract agency" will be used throughout the text. These agencies can, and often do, receive money from the State Mental Health Division.

^{3/} Though figures are not available, these alternatives probably are location and income specific. For example, psychiatrists, like doctors, tend to set up practices in urban areas. Moreover, private psychiatric help may be too expensive for many persons.

The State Mental Health Division broadly classifies patients and clients into one of three categories:

- (A) persons who are emotionally and mentally disturbed,
- (B) persons who are mentally retarded or developmentally disabled,
- (C) persons with alcohol or drug dependencies.

Of course, these rough categorizations do not adequately describe the problems of any given individual. For example, a person who is labeled as emotionally and mentally disturbed may have marital or family problems, an inability to cope with their work, neighbors, or classmates, or deep-seated compulsive behavior. Still, they are useful categories.

Not all of the county programs provide care for the three types of patients. This depends on whether a private agency provides care for patients with a particular handicap or whether the county has the money for a specific activity. The state funds over 20 sub-programs to aid the mentally and emotionally disabled. Table 4 gives a listing of some of the main service elements.

Tables 5, 6, and 7 provide a thumbnail sketch of the county programs. Table 5 shows the number of patients treated by the county clinics in 1975-1976. These figures include first admission patients and those who had been admitted in previous years and were still being treated. They exclude the patients treated at county alcohol centers.

Table 6 shows the numbers of patients admitted to the county clinics during the 1975-1976 fiscal year. The figures have been broken down by the broadly identified problem of the entering patient. The

Table 4. Mental Health Division Service Elements: A Partial Listing

Mental Retardation and Developmental Disability

1. Community Residential Centers
2. Activity Centers
3. Parent Training and Counseling
4. Pre-School Programs
5. Service Coordinators
6. Trainable Mentally Retarded School Programs

Mentally and Emotionally Disturbed

1. Community Mental Health Clinics
2. Inpatient Treatment
3. Day Treatment
4. 24-Hour Emergency Involuntary Commitment

Alcohol and Drug Related

1. Antabuse
 2. Detoxification Centers
 3. Halfway Houses
 4. Councils on Alcoholism
 5. Prevention of Alcohol and Drug Abuse
-
-

Source: Oregon State Mental Health Division

Table 5. Total Patients Served by Age and Sex by Oregon County Programs, 1975 - 1976^{1/}

County	0 - 18		19 - 44		Over 44		Subtotal		TOTAL
	M	F	M	F	M	F	M	F	
	(Number)		(Number)		(Number)		(Number)		
Baker	469	359	271	480	135	179	875	1,018	1,893
Benton	122	112	523	657	83	83	728	852	1,580
Clackamas	829	576	1,209	1,384	309	336	2,347	2,296	4,643
Clatsop	126	80	248	260	74	53	448	393	846
Columbia	151	87	199	229	94	48	444	364	808
Coos	236	164	327	391	80	90	643	645	1,288
Crook	-	-	-	-	-	-	-	-	-
Curry	34	41	45	87	23	34	102	152	254
Deschutes	82	89	234	307	55	58	371	454	825
Douglas	183	154	318	482	80	130	591	766	1,357
Grant	85	75	112	154	61	45	258	274	532
Harney	59	50	38	87	24	24	121	161	282
Jackson	146	124	522	815	79	143	747	1,082	1,829
Jefferson	103	78	118	153	35	31	256	262	518
Josephine	161	154	312	443	98	94	571	691	1,262
Klamath	245	155	284	449	60	81	589	685	1,274
Lake	23	15	25	58	5	6	53	79	132
Lane	192	113	772	852	120	266	1,084	1,231	2,315
Lincoln	112	81	315	229	114	75	541	385	926
Linn	245	180	596	773	174	186	1,015	1,139	2,154
Malheur	62	83	221	260	72	55	355	398	753
Marion	445	251	696	907	192	278	1,333	1,446	2,779
Mid-Columbia ^{2/}	151	87	199	229	94	48	444	364	808
Morrow	55	33	68	83	25	19	148	135	283
Multnomah	1,217	904	2,326	3,168	542	1,003	4,085	5,075	9,160
Polk	91	82	152	195	37	66	280	343	623
Tillamook	103	68	128	225	44	60	275	353	628
Umatilla	305	244	515	630	181	204	1,001	1,077	2,078
Union	109	69	140	226	22	38	271	333	604
Wallowa	45	29	43	93	27	42	115	164	279
Washington	225	145	683	938	159	204	1,067	1,289	2,356
Wheeler-Gilliam	17	11	15	24	19	15	51	50	101
Yamhill	111	68	151	229	38	62	300	359	659

^{1/} This does not include patients served by alcohol clinics.

^{2/} The Mid-Columbia consists of Sherman, Wasco, and Hood River Counties.

Source: Oregon State Mental Health Division, "Annual Report Community Mental Health Clinics: July 1975 - June 1976"

Table 6. Admissions to County Mental Health Programs by Presenting Problem, 1975 - 1976^{1/}

County	Mentally and Emotionally Disturbed (Number)	Alcohol and Drug (Number)	Mentally Retarded and Developmental Disability (Number)	Miscellaneous (Number)
Baker	608	10	17	7
Benton	284	107	1	12
Clackamas	1,209	329	119	56
Clatsop	271	102	3	36
Columbia	157	69	0	21
Coos	642	93	67	27
Crook	-	-	-	-
Curry	91	7	10	12
Deschutes	435	87	9	18
Douglas	526	2	8	20
Grant	174	29	0	20
Harney	118	17	1	3
Jackson	919	40	7	64
Jefferson	166	26	4	6
Josephine	387	37	15	17
Klamath	656	530	0	8
Lake	72	0	0	1
Lane	608	264	0	318
Lincoln	284	173	26	17
Linn	929	164	1	54
Malheur	360	111	0	24
Marion	650	85	7	176
Mid-Columbia ^{2/}	478	161	16	94
Morrow	146	2	0	9
Multnomah	3,754	42	6	675
Polk	211	12	0	10
Tillamook	222	6	7	30
Umatilla	467	162	1	454
Union	315	4	1	15
Wallowa	104	11	5	27
Washington	1,007	196	11	127
Wheeler-Gilliam	44	7	4	0
Yamhill	430	3	6	22

^{1/} This does not include patients served by alcohol clinics.

^{2/} The Mid-Columbia consists of Sherman, Wasco, and Hood River Counties.

Source: Oregon State Mental Health Division, "Annual Report Community Mental Health Clinics: July 1975 - June 1976"

Table 7. Revenues Generated for Mental Health Programs in Oregon Counties,
Including Sub-Contract Agencies: 1975 - 1976 ^{1/}

County	Federal Funds	State Funds	Fees and Contributions	County General Fund	TOTAL
	(\$)	(\$)	(\$)	(\$)	(\$)
Baker	85,908.00	86,752.44	63,939.51	24,979.13	261,579.58
Benton	46,265.00	245,075.00	71,614.00	117,223.00	502,177.00
Clackamas	120,732.00	474,391.00	344,462.00	169,980.00	1,109,565.00
Clatsop	29,873.00	103,397.00	89,563.00	58,710.00	281,543.00
Columbia	52,306.00	93,887.00	100,976.00	25,331.00	272,500.00
Coos	31,351.00	176,360.00	72,859.00	134,421.00	414,991.00
Crook	14,850.00	3,283.00	4,500.00	5,968.00	28,601.00
Curry	14,078.00	47,923.00	6,760.00	37,298.00	106,059.00
Deschutes	20,739.00	111,461.00	20,140.00	69,164.00	221,504.00
Douglas	21,122.00	270,176.00	174,388.00	37,054.00	502,690.00
Grant	32,330.00	20,465.00	9,888.00	22,257.00	84,940.00
Harney	30,959.00	51,898.00	19,933.00	34,779.00	137,569.00
Jackson	91,377.40	401,174.00	188,634.00	195,876.00	877,061.40
Jefferson	13,558.00	65,975.31	20,922.00	29,205.00	129,660.31
Josephine	1,011,610.00	237,966.00	151,550.00	200,211.00	1,601,337.00
Klamath	207,145.00	218,564.00	99,977.00	51,440.00	577,126.00
Lake	0.00	16,529.00	0.00	15,398.00	31,927.00
Lane	214,142.00	860,143.00	455,280.00	403,695.00	1,933,260.00
Lincoln	27,972.00	58,493.00	13,400.00	50,472.00	150,337.00
Linn-Benton	21,666.00	195,533.00	49,182.00	127,879.00	394,260.00
Malheur	196,451.00	60,621.00	59,963.97	9,909.32	366,945.29
Marion	171,169.00	352,280.00	105,193.00	118,000.00	946,642.00
Marion-Polk-Yamhill	37,642.73	65,841.00	8,502.00	51,393.00	163,378.73
Polk	63,689.50	126,710.00	43,973.85	67,481.00	302,254.35
Yamhill	30,579.50	156,163.50	92,225.00	47,659.50	326,627.50
Mid-Columbia ^{2/}	267,260.00	115,224.00	84,605.00	56,932.00	524,021.00
Multnomah	93,049.00	2,300,440.00	4,884,034.00	1,009,968.00	8,287,491.00
Tillamook	2,219.00	68,465.00	80,820.00	30,610.00	182,114.00
Umatilla-Morrow	508,815.00	240,415.00	364,588.84	45,582.00	1,159,400.84
Union	257,667.00	257,894.00	43,872.75	43,380.02	607,813.77
Wallowa	31,592.00	11,609.00	5,504.00	1,468.90	50,173.90
Washington	75,502.00	524,853.00	284,325.00	59,885.00	444,565.00
Wheeler-Gilliam	32,220.00	13,429.00	9,312.00	2,983.30	57,944.30

^{1/} According to contract arrangements as of July 27, 1976

^{2/} Mid-Columbia consists of Sherman, Wasco, and Hood River Counties.

Source: Oregon State Mental Health Division.

tables does not, however, include figures on the number of patients admitted to county alcohol clinics or the identified problems of patients admitted in previous years because of an absence of data.

Table 7 shows the amount and source of revenues for the Oregon county and private agency programs for the fiscal year 1975-1976. By and large, state and federal aid made up the bulk of the revenues for these programs, while the county general fund monies (taxes, unconditional grants and fees) made up less than 50 percent of the total revenue generated.

The amount of state aid received by Oregon counties was and is determined through contractual arrangements with the Mental Health Division. The total application, often over 20 pages in length, includes information about the socio-economic characteristics of the county, the number of patients served in the previous year, the proposed service elements for the coming year, and the actual dollar amount requested. After reviewing the aid requests, the state determines the final aid allocation, by service element, to each of the counties. The state, then, reimburses the costs of community mental health clinics, detoxification centers, and halfway houses on a 50-50 basis, providing a dollar of state money for every two dollars spent. The costs incurred by the county for the remaining service elements (see Table 4) are reimbursed fully by the state.

Thirteen eastern Oregon counties receive a variable matching rate grant that underwrites the staffing costs of the mental health clinics. As described previously, this staffing grant has had and will have a different matching ratio for each year of the eight-year grant program. In fiscal year 1975-1976, the federal government paid for 80 percent of

the staffing costs, the state and county splitting the rest. The staffing grant was the main source of revenue for the eastern Oregon County programs.

Table 8 gives a partial listing of the types of federal grants received by the state and the counties by August, 1976. Except for the eastern Oregon counties, federal aid generally made up a small part of the county mental health revenues.

Framework: Multiple Agents and Multiple Decisions

For over 25 years, economists studying the intricacies of local fiscal choice have wrestled with two interrelated questions: (1) What are the explicit goals and behavior guiding tax and expenditure decisions? And (2) who makes the tax and expenditures decisions for a jurisdiction? For the most part, they settled on some form of utility maximization as the governing force behind local government fiscal behavior, attributing the utility-maximizing behavior to the community, to a controlling community clique embodied in a local elected official, to the median voter, and to the bureaucrat. The production choices made by local governments were collapsed into the single, overriding tax and expenditure decision.

The carefully developed studies noted, though, that budgeting and output decisions were made in a defined and complex process that is open at certain junctures to bargaining and exchange among individuals and groups.^{4/} Citizen groups -- the Chamber of Commerce, the friends of the library, dog owners, senior citizens, and the myraid of constituencies --

^{4/} For specific information about Oregon county budgeting, see Tollenaar, Kenneth and Bruce Weber, County Government in Oregon, Corvallis: Oregon State University Extension Service (in process).

Table 8. Partial Listing of Federal Grants Received for State Administration and County Programs; August, 1976

Grant Title	Matching Requirements
<u>National Institute on Drug Abuse</u>	
1. Umbrella Grant	Administration 50%
2. Drug Abuse Reporting Process	Treatment 20%
3. State Training System	None
4. Drug Formula: PL 92-255	None
<u>National Institute of Mental Health</u>	
1. Community Living for Mentally Retarded Adults	None
2. Alcohol Formula: PL 91-616	None
3. Implementation of Uniform Drug Act	None
4. 314(d) Formula	None
<u>Miscellaneous</u>	
1. Developmental Disabilities	NA ^{1/}
2. Alcohol Monitoring	None

^{1/} The matching requirements could not be determined.

Source: Oregon State Mental Health Division

push for their often conflicting concerns through voting, campaign donations, leafletting, boycotting, testifying at public hearings, moving to new communities, and other forms of political activity.^{5/} At the heart of their activity, of course, is the desire for a given quantity and quality of public services at acceptable fee and tax levels. Voting, it is argued here, is a particularly crucial form of "demand revelation" as evidenced by the "taxpayer revolt" in California. Thus, the residents' decision to vote or not to vote in any election and their choice in the elections for local representatives and tax levies are critical to broad budget decisions. In a sense, votes are the medium of exchange at budget and election time.

Within the government hierarchy, local government employees, potentially an imposing bloc of voters, bargain for increased wages and directly affect the quantity and quality of public services produced. The service department heads propose budgets and programs for their department in competition with other department heads for the limited local government money, often compete with the departments heads of other jurisdictions for state and federal grants-in-aid and regulate the quantity of public goods produced through their choices of an input mix and the labor skill mix. The executive administrators arbitrate the money conflicts among departments and the wage conflicts with employees and propose the initial budget package that goes before the elected officials. Finally, during budget deliberations and throughout the year, the elected council members must reconcile the competing claims of their constituents and the competing claims of the public service bureaus with their own desires. These individuals, the hired staff and the elected representa-

^{5/} Also, by Oregon law, local government budget committees are required to have an equal number of citizen members and elected officials.

tives, have varying degrees of control over the budget and output decisions and, like the voters, are motivated by their preferences for income, prestige, re-election or various other behavior goals.

Despite the apparent conclusion that identifying a single decision-maker seems fruitless, researchers have correctly pointed out that decisions are made, that taxes are traded off for public goods subject to revenue and cost constraints, and that (given certain assumptions about voting, the political climate, factor prices, and public service technology) the observed levels of expenditures, taxes, and public services could be linked to the preferences of some representative individuals (Johnson, 1976). This approach has had shortcomings, though: (1) researchers have given undue consideration to consumption, to the demand for expenditures and services and (2) the local fiscal choices have been attributed to a single decision-maker.

Specifically, researchers have assumed that a single decision-maker has the interrelated roles of determining how much tax revenue is generated, how much is spent for the different public services, and, when supply phenomenon were considered, the mix of labor, capital, and material inputs, and the specific production technology. Yet, the preferences of voters, elected officials, hired administrators, and bureau employees filter through all of these decisions. Local budgeting is a political as well as an economic game characterized by exchange and bargaining as well as hierarchial control. Moreover, the production relationships should be separated from the consumption decisions.

Taking a cue from Robert Inman's analysis, what is argued here is that budget decisions, at least for Oregon counties, should be separated into an expenditure stage and an output stage. In the expenditure stage,

the county commissioners are asserted to make the broad tax and expenditure choices. The ex post expenditure allocations for services are assumed to be the result of an as-if preference maximization subject to a revenue constraint or, in other words, the commissioners' ex ante demand for expenditures. As in consumer demand theory, expenditures are not the source of satisfaction but the agent for votes and monetary and psychic income. The three types of mental health grants are asserted to enter separately into the revenue constraint. The amount of each type of grant received by the counties is assumed to be a function of the information contained in the state-county contracts.

In the output stage, the mental health program directors and employees are asserted to determine the input and labor skill mix and the quantity and quality of service contingent upon the allocated spending level. By their choice of programs, they, additionally, influence the numbers of persons served by the mental health department.

County residents enter into this process in two ways. Firstly, as voters, they affect to some degree the observed budget decisions. Secondly, as potential users of the mental health facilities, they alter the production decisions for the mental health programs and other services by choosing to consume the service, by not consuming the service, or by choosing to consume the services of alternative public and private producers. We shall see now how these "economizing groups" are purported to resolve the basic issues of county budgeting and production for mental health services.

Expenditure Stage

This study adopts the basic assumption of the utility maximization model -- that the prevailing decision-maker for the broad budget alloca-

tions for Oregon counties is the elected commission.^{6/} The influence of voters, or specifically the median voter, in these decisions has been downplayed for several reasons.

(1) Few counties have been forced by lack of funds to take tax levies, which partially support the budget, before the voters for election approval. For fiscal year 1976-1977,^{7/} only four of the 36 counties sent a tax levy to the voters (Oregon State University Extension Service, 1976, p. 5).

(2) Counties are multi-service governments. This presents the blue plante menu problem in that voters are simply given a yes or no option on a complete budget package or on the budget package proposed by a political candidate. The departmental budgets cannot be voted on separately. Information requirements are increased, resulting possibly in a smaller turnout

^{6/} When the term decision-maker is used to represent a group of individuals, such as for the county commissioners, it is assumed that this group acts as a single voice. Johnson (1976) has an excellent discussion about the pitfalls of ascribing a consistent utility function to a collective body.

^{7/} By law, Oregon local governments are permitted a yearly six percent increase in the "tax base", the tax levy permitted without a vote of the people. Oregon counties may adopt a budget and levy a tax without a vote of the people if they do not need property taxes in excess of six percent limitations. For a more complete discussion, see Oregon's Six Percent Limitation, Extension Circular 906, published by the Oregon State University Extension Service.

This reason only suggests that the internal budget allocations are not open to voter scrutiny. A relevant question is why the counties did not ask for a larger budget and voter approval of taxes in excess of the six percent limitation.

for elections. Also, residents may have to vote strategically, supporting or rejecting a total budget or candidate because of the proposed allocations for a single service.

- (3) Voter turnout for county candidate and levy elections in Oregon has been comparatively low. Moreover, it is possible that the residents who do vote are in a particular spectrum of the counties' income distribution.

These characteristics of county politics suggest that only a plurality of residents affect the budget outcomes and that the elected representatives are insulated, to a degree, from scrutiny in their decision-making. For this study, these two observations are connected into the single assumption that the county commissioners monopolize the budget decisions, perhaps as the voice of a favored, voting constituency.^{8/}

The preference structure for the county decision-makers is rooted in their desire for (re)election, their desire for out-of-office and in-office income, and their desire for the prerequisites of command over the budget; the power and prestige associated with the expenditure mix and size.^{9/} The observed expenditures allotted to any service, given the

^{8/} There is a qualitative difference in this control if the county has hired a county administrator. Approximately half of the 36 Oregon counties had an executive manager in 1975. Because of "information asymmetries," the executive administrator would tend to dominate the budget and program debates, the elected council becoming, in Inman's words, "a weak vetoing agent" (Inman, 1977, p. 48). This information gap is caused by the administrator's extended knowledge about the budget and programs. Despite this, the basic assumption has still been retained.

^{9/} The "command" over a budget would include altruistic concerns for the dispossessed members of a jurisdiction and for the general quality of life. Niskanen (1971) amplifies this point.

working county revenue constraint, is hypothesized to reflect the ability of a service to affect the probability of the commissioners' election and the level of economic, political and psychological income gained by the commissioners relative to another county service department and its citizen backers (Inman, 1977, p. 50). The likely budget winners under this assumption would be the bureaus (1) that provide the services favored by individuals in the middle and higher income brackets; (2) that provide construction jobs, regulate commercial and industrial activity, and ensure the safety of individuals and property; (3) that have few private and public competitors; and (4) that have ready access to shared tax revenues and federal and state grants.^{10/} Under these criteria, road and law enforcement departments in Oregon counties would tend to be budget winners. Park, library, and health services, on the other hand, would tend to fare poorly in budget decisions. The mental health departments in Oregon counties have fared adequately, in the main, because they have been bolstered by a large supply of state and federal grants. Without these bargaining chips, though, the spending for mental health services would probably fall over time.

The Preference Structure for County Decision-Makers

The decision-makers utility function is asserted to contain four arguments: (1) the per capita current expenditures for mental health services (Emh); (2) the per capita current expenditures for all other county services (Enmh); (3) the average after-tax income for county residents (Y); and (4) the per capita surplus left for future spending, the ending fund balances (EFB).

^{10/} This is an expanded version of a list first proposed by Inman (1977).

$$(1) \quad U = U(E_{mh}, E_{nmh}, E_{FB}, Y)$$

Capital investment (claims on future spending and consumption) and debt-financing (claims on future community income) have been omitted from the analysis though a strong argument could be made that the decision-maker's utility function contains future spending and income. The decision-makers are considered myopic in their concerns because of the absence of information about future preferences for spending and the future income levels (Inman, 1977, pp. 12-13). In addition, the expenditures for public service enterprises (hospitals, airports) have been excluded from consideration because they are services not typically provided by counties, because they tend to be self-supporting and because the counties have, at best, a loose administrative control over their operations.

Decision-makers are assumed to prefer greater expenditures for mental health programs to less. Mathematically,

$$(2) \quad \frac{\partial U}{\partial E_{mh}} > 0$$

Further, each additional dollar allocated to mental health services adds diminishing amounts of utility or satisfaction:

$$(3) \quad \frac{\partial^2 U}{\partial E_{mh}^2} < 0$$

The expenditures for all other services have been purposely combined into the variable E_{nmh} because they are of minor importance to this study. It is assumed that county decision-makers gain greater satisfaction from spending more on these services together, but obtain a diminishing satisfaction as additional dollars are expended to these services. Thus,

$$(4) \quad \frac{\partial U}{\partial \text{Enmh}} > 0,$$

$$(5) \quad \frac{\partial^2 U}{\partial \text{Enmh}^2} < 0.$$

The ending fund balance (EFB) term has been included as an argument in the county decision-makers' preference function because of the multiple roles this money plays. This carry-over from the current year budget provides, in a way, for future consumption and the growth of future budgets. As ending fund balances increase, moreover, local officials are less compelled to rely on taxes and other local sources in future years to finance county services. The resulting reduction in the burden of taxes might enhance and solidify the position of the decision-maker. There is a possibility, though, that excessive carry-over may work against the decision-maker if citizen-voters rebel against paying taxes that would lay idle in the county coffers. Conceptually, it is argued that:

$$(6) \quad \frac{\partial U}{\partial \text{EFB}} > 0$$

$$(7) \quad \frac{\partial^2 U}{\partial \text{EFB}^2} < 0.$$

The final argument in the proposed utility set for decision-makers, per capita after-tax income, has been included as a measure of the burden of taxes. The concept of the burden imposed by county officials on residents through taxes has been inadequately handled in the literature.^{11/} Intuitively, officials for their own well-being are concerned about the incidence of local taxes.^{12/} After-tax income, though a commonly used

^{11/} See Johnson (1976) for a discussion of the concept.

^{12/} Particularly, as an inducement to industry because of the potential changes in the tax base.

measure, is an imperfect measure because it does not fully account for the distribution of tax payments. Better measures of tax burden, such as the ratio of tax payments to income, proved troublesome to incorporate into the constrained maximization framework used here and, consequently, were not included. It is assumed that officials gain positive increments in utility, at a diminishing marginal rate, from increasing after-tax income. Symbolically,

$$(8) \quad \frac{\partial U}{\partial Y} > 0$$

$$(9) \quad \frac{\partial^2 U}{\partial Y^2} < 0$$

The County Budget Constraint

As in consumer demand theory, it is assumed that the county decision-makers face a county budget or revenue constraint that limits the amount of money that can be allocated to public services. By law, Oregon counties are required to balance their budgets such that the outflows for factor payments and budget surpluses must equal the inflows from the various revenue sources. As a result, the county budget constraint can be derived from a series of identities. For purposes of the analysis, major capital construction, debt financing, trust funds, and tax pass-throughs have not been included in the structural equations.

On the inflow side (Inf), Oregon receives seven different types of revenue: taxes, charges, and fines from local taxpayers (T);^{13/} ending fund balances from the previous year (CB); conditional grants earmarked

^{13/} Taxes, fees, fines, and other local revenues have been combined into the single tax term because of the data. Taxes make up the majority of local county revenues. The aggregated term, it is assumed, should serve as a reasonable proxy for total tax collections.

for county services other than mental health services (Gn); unconditional grants (Gu); non-matching mental health grants (Gmnh); the 50 percent matching mental health grants (Gmh); and the federal staffing grant that partially finances the mental health clinics in 13 eastern Oregon counties (Gs). The resulting inflow identity is:

$$(10) \quad \text{Inf} = T + \text{CB} + \text{Gn} + \text{Gu} + \text{Gmnh} + \text{Gmh} + \text{Gs}$$

The matching mental health grants received by Oregon counties (Gmh, Gs) have not been entered in the budget constraint as price shifters for two reasons. Firstly, as discussed earlier in Chapter III, Weber and Savage's results indicate that the ex-post matching ratio for the grants did not affect local allocations (Weber and Savage, 1977). In other words, the matching grants acted as income supplements. Secondly, all counties received in fiscal year 1975-1976 some state or federal grants with a defined matching rate (50-50 for the state grants, 80-10-10 for the federal staffing grant). The ex-ante price for these grants is a constant up to the limit on the amount of grants appropriated by the donor government. It is that limit and not the matching ratio that is shifted by the preferences of the donor government and competed for by the directors of the county mental health departments. It is that limit, acting as a boundary on the amount of new revenues coming into the county coffers, that affects the commissioners' decisions on spending for mental health as well as other county services. And it is that limit that serves as a bargaining chip for the mental health employees at budget time, since more grant money implies more programs and more patients.

The total inflow of revenues, including the grants, is spent for mental health programs (Emh), for other county programs (Enmh), or it

remains for future spending (EFB). The outflow (Out) can be expressed as:

$$(11) \quad \text{Out} = \text{Emh} + \text{Enmh} + \text{EFB}$$

Since outflows must equal inflows, the relevant budget constraint is given by:

$$(12) \quad T + \text{CB} + \text{Gn} + \text{Gu} + \text{Gnmh} + \text{Gmh} + \text{Gs} = \text{Enmh} + \text{EFB}$$

The county's tax collections (T) can be expressed in terms of community income and residential tax burdens. To do this, we must first note that:

$$(13) \quad Y = I - t\pi b$$

where Y is per capita after-tax income, I is per capita before-tax county income,^{14/} t is the effective county tax rate facing the average individual, b is the average individual's tax base,^{15/} and π is an index of the burden of a dollar of local taxes after the deduction for federal and state tax credits. π was not calculated for this study and, thus, has not been included in the following discussion.^{16/}

The total taxes collected by an Oregon county can be derived from the identity:

$$(14) \quad T = tBA$$

^{14/} In this formulation, the before-tax income term should not include the taxes paid to other governments.

^{15/} The average individual's tax base is for residences only.

^{16/} One interesting application of the π index would be to determine the effect of property tax relief on county spending.

where T and t have been defined previously, B is the total county assessed value per person, and A is the county population. Solve for t in equation 13 and then substituting equation 13 into equation 14 results in the expression:

$$(15) \quad T = (I - Y)(B/b)A$$

Substituting this equation into equation 12 gives:

$$(16) \quad (I - Y)(B/b)A + CB + G_n + G_u + G_{nmh} + G_{mh} + G_s = E_{mh} + E_{nmh} + E_{FB}$$

Rearranging terms results in the modified budget constraint:

$$(17) \quad I + \tau CB + \tau G_n + \tau G_u + \tau G_{nmh} + \tau G_s = Y + \tau E_{mh} + \tau E_{nmh} + \tau E_{FB}$$

where τ is equal to b/B or the residential fraction of the property tax base, all variables are deflated on a per capita basis, and the price of after-tax income is assumed equal to one.

Demand Equations

Maximizing the decision-makers' preference function (1) subject to the county revenue constraint (17) results in a series of demand equations for per capita public service expenditures, per capita ending fund balances, and per capita after-tax income:

$$(18) \quad E_{mh} = E_{mh}(G_n, G_u, G_{mh}, G_s, CB, \tau, I; U)$$

$$(19) \quad E_{nmh} = E_{nmh}(G_n, G_u, G_{mh}, G_{nmh}, G_s, CB, \tau, I; V)$$

$$(20) \quad E_{FB} = E_{FB}(G_n, G_u, G_{mh}, G_{nmh}, G_s, CB, \tau, I; W)$$

$$(21) \quad Y = Y(G_n, G_u, G_{mh}, G_{nmh}, G_s, CB, \tau, I; X)$$

where U , V , W , and X are the unobserved determinants of demand. Both per capita gross county income (I) and the residential fraction of the property (τ or b/B) are considered exogenous variables in this study. It has been assumed that the commissioners' tax and expenditure choices do not affect the location and investment decisions of firms and individuals.^{17/} The grant variables are similarly considered exogenous for reasons given in the next section.

Grantsmanship Equation

It was suggested earlier that one of the reasons mental health programs thrive at the county level was because of the constant inflow of state and federal grants. The grants, politically, serve a dual role. They lessen the burden of local financing for mental health services, a fact that makes the provision of mental health services that more palatable to voters and commissioners. And they support programs that aid the mentally and emotionally handicapped, an often dispossessed and stigmatized group of persons in the community.

Since the grants benefit the mental health programs in these separate ways, it is in the interest of the mental health program director and staff to "win" these federal and state mental health grants, all of which are allocated by the donor governments on an application and approval basis. Because they compete with other counties for the grant money, a county directors and staff's success in obtaining aid depends on the applications made by other county programs and the preferences of the donor government officials who make the allocation decisions. This competition

^{17/} Early on in this study, the taxes paid by residents to other governments was included as a price variable. It was subsequently dropped.

is the source of the "grantsmanship," the gaming strategy for receiving the greatest possible amount of federal and state grant dollars.

Grantsmanship has become an increasingly important topic in the literature, particularly with respect to whether the application and approval grants appropriated for a service are simultaneously determined with the expenditures for that service (Feldstein, 1975; Johnson, 1976; Inman, 1977; Wilde, 1977). There have been no hard and fast pronouncements on this issue. Researchers' comments generally have taken the form of warnings; urging their fellow researchers to consider the possible simultaneous determination of the matching rate or the absolute amount of aid with expenditures.

For this study, it is hypothesized that the amount of mental health grants received are not simultaneously determined with the level of spending for the mental health program. Though a feedback exists between the grants and spending, this feedback exists between the decision on grant appropriations made in one time period and the budget decisions made in a separate time period. While there is some overlap in decisions, the grant appropriations largely precede the county budget allocations. There is a corresponding lag in the feedback. The amounts of grants-in-aid disbursed by the state and federal officials, it is hypothesized, is based on the grant proposals submitted by the mental health directors. These proposals have a set format in which the county describes its activities in the previous year and the activities proposed for the coming year. Since the information on what has happened is more concrete than a narrative on what will happen, it is asserted that the amount of aid is functionally related to certain key variables observed in the previous year.

These explanatory variables can be divided into those variables controlled, if only partially, by the county and those largely outside control of the county government. The latter explanatory variables include the population of the county (POP_{t-1}), the population density of the county ($POPD_{t-1}$), the per capita income level (INC_{t-1}), the county unemployment rate (UNE_{t-1}), the number of psychiatrists, psychologists, social workers, and counselors in private practice per 1,000 persons in the county (PSY_{t-1}), and the per capita amounts of grants received by sub-contract agencies (SUB_{t-1}). These are considered in this study as felt-need variables that affect the donor government officials' choices for aid allocations. Accordingly, it is assumed that population (POP_{t-1}), the population density ($POPD_{t-1}$), and the unemployment rate (UNE_{t-1}) would be positively related to the amount of aid dispensed and that the per capita income level (INC_{t-1}), the number of alternative practitioners (PSY_{t-1}), and the payments to private agencies (SUB_{t-1}) would be negatively related to the level of grants.

The factors affected by the activities of the county programs are the per capita expenditures for mental health services in the previous year (MHE), the number of residents served by the mental health programs (N_{t-1}), and the percentage of patients considered "improved" when they left the program (TR_{t-1}). As measures of the success of the county program, they are assumed to be positively related to the amount of aid appropriated. For all three types of mental health grants, the functional relationship can be expressed as:

$$(22) \quad G_i = G_i(POP_{t-1}, POPD_{t-1}, INC_{t-1}, UNE_{t-1}, PSY_{t-1}, SUB_{t-1}, \\ N_{t-1}, TR_{t-1}, MHE). \\ i = S_t, MII_t, NMII_t.$$

where G_i equals the per capita amounts of the federal staffing grant, the non-matching mental health grants and the matching mental health grants received by Oregon counties in time period t .

Output Stage

During budget deliberations, the mental health administrator and staff submit a proposed departmental budget for the coming year. As it was characterized earlier, they essentially compete and bargain for the limited county government resources. Their success in obtaining a desired level of county dollars depends on their influence on the commissioners' attainment of utility. This influence comes partly from the production choices made, it is assumed, by the mental health bureau employees.

While the county commissioners are asserted to determine the spending level and mix, they may have little say over what is contained in the budget. It can be argued that they have neither the time nor the information base to decide whether a psychiatrist should be hired rather than a social worker and a psychologist, or whether money should be allocated for a training program for the mentally retarded as opposed to an alcoholic rehabilitation program. They deal primarily with the large budget allocations; the mental health departments deal primarily with the internal budget allocations and the production decisions for mental health services.

This division of labor is of course not as neat as it is expressed in this model. There are negotiations concerning the number of staff and the mix of staff skills that are part of the budget deliberations. But in the main, it seems reasonable to split these decisions between

the executive staff and commissioners and the mental health administrator and his staff.

The mental health program director and staff is perceived as playing an important role in determining the labor-capital mix, the mix of staff with different skills, and the program emphasis. These decisions are interrelated and dictate the direction of the department. The mental health director continually makes tradeoffs concerning the provision of services for the three groups of mental health patients. These decisions include (1) whether the department provides services for a patient with a particular problem, say mental retardation, or sub-contracts with other agencies for these services; (2) whether the department hires licensed psychiatrists and psychologists at higher wages or social workers, mental health aides and specialists at lower wages; (3) whether to emphasize programs for one group of patients as opposed to another; (4) whether to emphasize a particular type of program for a client group as opposed to another; and (5) whether to emphasize care for new patients or not.

These decisions are hypothesized to reflect the preferences of the administrator subject to a production technology and the bureau's budget or cost constraint. The mathematics of this proposed utility maximization process are not straight forward because of interdependencies among certain key variables. Thus, while utility maximization will serve as the conceptual framework for the following discussion, the structural equations will not be rigorously derived.

The bureau decision-makers, the mental health program director and current staff, probably gain utility from a number of factors -- the number of patients served, the number of new patients served, the number or percentage of professional staff, as well as the size of the depart-

ment's budget. This list is not exhaustive. Nor would it be exactly the same for any two mental health bureaus. Moreover, the want-satisfying agents in the bureaucrats' preference structure may be tied to the commissioners' preference structure. Nonetheless, it is posited that the mental health decision-makers gained utility from the number of professional or skilled staff per 10,000 persons in the county (Lp)^{18/} and the level of successful treatment (Tr), measured by the percentage of patients considered "improved" when they leave the care of county programs.^{19/}

Treatment Level Function

It is hypothesized that the improvement percentage (Tr) is functionally related to the number of skilled staff per 10,000 county residents (Lp), the number of lesser-skilled staff per 10,000 community residents (Lnp), material and capital costs per capita (EOC), and the total number of patients served in a year (N).

$$(23) \quad Tr = Tr(Lp, Lnp, EOC, N)$$

Because of data constraints, numerous elements of this "production function" were not considered. Probably the most glaring omission is

^{18/} Skilled staff include psychiatrists, psychologists, social workers, nurses, and mental health specialists. The lesser-skilled staff are defined to secretaries, clerks, and assistants who have not had specialized college training.

^{19/} When patients are no longer served by the counties, county staff members rate the patients as to whether their condition was improved, remained the same, or worsened after treatment. The persons who do not remain in a program represent only a subset of the patients served for any given year. Intriligator (1978, p. 173-175) noted the problems associated with a qualitative dependent variable such as Tr. The response to these problems is discussed in Chapter V.

that the labor, material, and capital inputs can be combined to produce different treatments, such as group therapy or individual counseling. These treatments, or service elements, are neither inputs nor final outputs, but are intermediate outputs that when combined result in a change in the improvement percentage. In addition, it was impossible to distinguish among the types of patients served^{20/} or to obtain specifics on the staff-patient environment such as the length of treatment, the patient load for a staff member, the patients-hours spent by the staff, and the frequency of sessions. All of these factors would affect the improvement percentage.^{21/}

It is hypothesized that the success rate increases as staff and material and capital inputs increase:

$$(24) \quad \frac{\partial Tr}{\partial Lp} > 0;$$

$$(25) \quad \frac{\partial Tr}{\partial Lnp} > 0;$$

$$(26) \quad \frac{\partial Tr}{\partial EOC} > 0.$$

^{20/} This factor may be particularly critical. A program that largely cares for the needs of persons who are mentally and emotionally disturbed may have a higher or lower success rate than a program that caters largely to the needs of the mentally retarded and developmentally disabled, ceteris paribus.

In addition, the individual patient, who asks for help from a county department may be more important to the likelihood of a successful treatment than the staff member of accompanying material aids. For example, the Marion County Mental Health Department, a large county department, is faced by an overload of patients released from the state hospital. Some of these persons might be chronic patients who would be given first priority by Marion County, though the probability of success is lessened.

Of course, a low success rate could also be explained by a non-supportive community environment.

^{21/} Another possible problem with this specification is that what one staff-member considers improvement another staff-member might not.

The total number of patients served by a department is assumed to depress the level of successful treatment. That is, as a larger number of patients are served less attention would be given to any one patient, thus lowering the probability of a successful treatment.

$$(27) \quad \frac{\partial \text{Tr}}{\partial N} < 0.$$

Skilled and Lesser-Skilled Staff Functions

The money allocated for county mental health programs acts as a budget-cost constraint that limits the "production" of successful treatment as well as the bureau decision-maker's preferences for skilled staff. This allotment is spent for salary costs and material and capital expenses. Maximizing the decision-maker's preference function subject to the improvement percentage function and the department's cost constraint results in demand functions for skilled and lesser-skilled staff. Accordingly,

$$(28) \quad L_p = L_p(E_{mh}, W_p, W_{np}, N),$$

$$(29) \quad L_{np} = L_{np}(E_{mh}, W_p, W_{np}, N).$$

where W_p is the average annual salary for the skilled mental health staff and W_{np} is the average annual salary for the lesser-skilled mental health staff. Expanding the E_{mh} term from equation 18, we obtain:

$$(30) \quad L_p = L_p(G_u, G_n, G_s, G_{mh}, G_{nmh}, CB, I, \tau, W_p, W_{np}, N), \frac{22/}{}$$

$$(31) \quad L_{np} = L_{np}(G_u, G_n, G_s, G_{mh}, G_{nmh}, CB, I, \tau, W_p, W_{np}, N).$$

^{22/} One possibly important determinant of the number of skilled staff employed is the influence of third party payers such as insurance companies.

The Average Annual Salary Functions

In earlier studies of local government fiscal decision-making, researchers generally assumed that the supply of inputs was perfectly price elastic (Johnson, 1976). Cities, counties, and other local governments were assumed to be, in other words, wage-takers, where the wage rate for public employees was determined in a larger competitive labor market or by union-bargaining outside the budgeting process.

This assertion would suggest then that a government's wage bill would change only as the number of employees changes, and that the grants would be filtered through the labor component to the production function. When wages change along with labor, that is, when wages are endogenously determined within the budget process, then the grant instruments may lead to increased wages as well as employees (Inman, 1977, p. 53).

The wage equation presented here assumes that the wages for skilled and lesser-skilled mental health employees are determined in a market setting, and that the supply of mental health employees is not perfectly price elastic. Mental health employees at this time were not unionized, so this was not a consideration. Specifically, it is asserted that the average annual salaries for the skilled and lesser-skilled staff are functionally related to the three types of mental health grants (Gs, Gmh, Gnmh), the opportunity salary in the county's service sector (OWS), the number of patients served by the county program (N), the population density of the county (POPD), the number of full-time equivalent staff per 10,000 community residents (L_p or L_{np}), the number of psychiatrists, psychologists, social workers and counselors in private practice per 10,000 community residents (PSY), and the per capita income level (INC). Conceptually, these relationships can be expressed as:

$$(32) \quad W_p = W_p(L_p, G_s, G_{mh}, G_{nmh}, OWS, N, POPD, PSY, INC);$$

$$(33) \quad W_{np} = W_{np}(L_{np}, G_s, G_{mh}, G_{nmh}, OWS, N, POPD, PSY, INC).$$

The explanatory variables were selected to represent the effect of the size of the program, the program emphasis, or the unique characteristics of the labor market. Equations 32 and 33 are labor supply functions which, together with the demand equations, constitute one view of the mental health wage and determination process.

Client-User Equation

The final equation in the complete system of equations attempts to explain the number of patients cared for by the department's staff over a year's time. A variety of patients enter county programs during this time. As can be distilled from the figures, a few persons come in for one-time talks with the clinic staff; many come in for a specified period of time that is less than a year; while others need long-term care and guidance. This diverse group has, unfortunately, been lumped together into a single figure.

There are two sets of factors that are hypothesized to determine the total patient figure. On the one hand, there are the traditional demand factors -- the price for a particular quantity of service, the price of private alternatives, the income level, population, and other taste variables. On the other hand, the number of patients that a staff is physically able to care for in a year is determined by technological factors, i.e., as a supply phenomenon.

The number of patients served is functionally related to the three mental health grants (G_s , G_{mh} , G_{nmh}), the county's population (POP), the

population density (POPD), the number of mental health specialists in private practice per 10,000 residents (PSY), the per capita amount of grants received by the sub-contract agencies (SUB), the per capita income level (INC), and the percentage of skilled staff (PS). The POP, POPD, PSY, SUB, and INC variables represent the demand-related factors. The grant terms have been included because each type of grant funds specific program elements of the mental health department; the matching grants, for example, underwrite the costs of the general clinic programs while the non-matching grants tend to underwrite the costs of programs for certain client groups such as training the mentally retarded, or day treatment. Accordingly, the grants would have a differential effect on the number of patients treated. The percentage of skilled staff variables (PS) has been included for two reasons. First, the perceived degree of "professionalism" in the clinic may affect a given individual's decision to seek out the county clinic. Second, the degree of skilled staff is assumed to have an effect on caseloads and the staff time spent per patient. Mathematically, the client-user equation can be expressed as:

$$(34) \quad N = N(Gs, Gmh, Gnmh, POP, POPD, PSY, SUB, INC, PS).$$

Estimating Equations and Tests of Hypotheses

The model of county budget presented in the preceding pages reduces to a system of estimating equations by introducing the unknown regression coefficients and the error term. The parameters for 11 separate linear equations will be estimated using regression analysis from observations for 31 Oregon counties in fiscal year 1975-1976. In the expenditure stage, the parameters of the demand functions for mental

health services (Emh) and other county services (Enmh) will be estimated using an Ordinary Least Squares (OLS) estimation procedures.^{23/} Variable definitions are given in Table 9.

$$(35) \quad \text{Emh} = \Lambda_0 + \Lambda_1(\text{Gs}) + \Lambda_2\text{Gmh} + \Lambda_3\text{Gnmh} + \Lambda_4\text{Gu} + \Lambda_5\text{Gn} + \\ A_6\text{INC} + A_7\text{CB} + A_8\text{RES} + U_1 \quad \underline{24/}$$

$$(36) \quad \text{Enmh} = B_0 + B_1(\text{Gs}) + B_2\text{Gmh} + B_3\text{Gnmh} + B_4\text{Gu} + B_5\text{Gn} + \\ B_6\text{INC} + B_7\text{CB} + B_8\text{RES} + U_1 \quad \underline{25/}$$

From the least squares estimates, we can test specific hypotheses about the expenditure effects of the mental health grant. At the outset, we will test the null hypotheses:

$$(37) \quad H_0: a_i = 1 \quad \text{for } i = 1, 2, 3$$

$$H_a: a_i > 1$$

$$(38) \quad H_0: b_i = 0 \quad \text{for } i = 1, 2, 3$$

$$H_a: b_i \neq 0$$

Similarly, we will test the null hypothesis that the parameter estimates for the grant variables are not significantly different from one another.

23/ Five assumptions have been made about the probability distribution of the error term:

(1) $E(U_i) = 0$; the expected value of the error term is zero.

(2) $E(U_i^2) = \sigma^2$; the variance of the error term is constant.

(3) $E(U_i U_j) = 0$ for $i \neq j$; the error terms are uncorrelated.

(4) The explanatory variables are independent random variables and $E(Y_i/X_i) = a + bX_i$

(5) The error term is normally distributed.

24/ The Gs term is in parentheses since only 13 counties receive this grant.

25/ Subscripts have been left off the variables. Individual observations are from the i^{th} county ($i = 1$ to 31) in year t (1975-1976).

Table 9. DEFINITIONS OF REGRESSION VARIABLES

Variable Name	Variable Label	Description
<u>Dependent Variables</u>		
1. Total Mental Health Expenditure	Em	Per capita expenditures for county mental health departments in dollars, F.Y. 1975-1976
2. Non-Mental Health Expenditure	Emnh	Per capita current expenditures for county departments other than mental health in dollars, F.Y. 1975-1976
3. Skilled Staff	Ep	Full-time equivalent employees of county mental health departments with specialized training per 10,000 population, F.Y. 1975-1976
4. Lesser-Skilled Staff	Elp	Full-time equivalent employees of county mental health departments without specialized training per 10,000 population F.Y. 1975-1976
5. Wage of Skilled Staff	Wp	Average annual earnings of mental health employees with specialized training in dollars, F.Y. 1975-1976
6. Wage of Lesser-Skilled Staff	Wlp	Average annual earnings of mental health employees without specialized training in dollars, F.Y. 1975-1976
7. Clients	N	Number of persons served by county mental health departments, F.Y. 1975-1975
8. Improvements	Tr	Percentage of patients considered improved when treatment finished, F.Y. 1975-1976
9. Percentage of Skilled Staff	PS	Percentage of mental health employees with specialized training, F.Y. 1975-1976
10. Materials Cost	EUC	Per capita expenditures for non-personnel costs for county mental health departments, F.Y. 1975-1976
<u>Independent Variables</u>		
11. Cash Balances	CB	Per capita beginning fund balances for Oregon counties in dollars, F.Y. 1975-1976
12. Residential Fraction of Property Tax	RLS	Percentage of assessed value attributable to residences for Oregon counties, F.Y. 1975-1976
13. Income	INC	Per capita county income in dollars, F.Y. 1975-1976
14. Service Wage	OKS	Average annual earnings of service sector workers for Oregon counties in dollars, F.Y. 1975-1976
15. Population Density	POPD	Population density for Oregon counties, F.Y. 1975-1976
16. Mental Health Professional in Private Practice	PSI	Mental health professionals practicing in Oregon counties per 10,000 population, F.Y. 1975-1976
17. Population	POP	Oregon county population, F.Y. 1975-1976
18. Sub-Contract Agencies	SUB	State aid to sub-contract agencies in Oregon counties in dollars per capita, F.Y. 1975-1976
19. Unconditional Grants	Gu	Unconditional aid received by Oregon counties in dollars per capita, F.Y. 1975-1976
20. Conditional Grants	Gn	Aid conditional upon non-mental health service uses in dollars per capita, F.Y. 1975-1976
21. Matching Mental Health Grants	Gmh	Matching aid received by county mental health departments in dollars per capita, F.Y. 1975-1976
22. Non-Matching Mental Health Grants	Gmnh	Non-matching aid received by county mental health departments in dollars per capita, F.Y. 1975-1976
23. Federal Staffing Grants	Gs	Matching aid underwriting mental health staffing costs for 13 eastern Oregon counties in dollars per capita, F.Y. 1975-1976
<u>Lagged Independent Variables</u>		
24. Clients	N _{t-1}	Number of clients served by county mental health departments, F.Y. 1974-1975
25. Improvement	TR _{t-1}	Percentage of patients considered improved when treatment finished, F.Y. 1974-1975
26. Population	POP _{t-1}	Oregon county population, F.Y. 1974-1975
27. Income	INC _{t-1}	Population density for Oregon counties, F.Y. 1974-1975
28. Population Density	POPD _{t-1}	Population density for Oregon counties, F.Y. 1974-1975
29. Unemployment Rate	UNL	County unemployment rate, F.Y. 1974-1975
30. Mental Health Professionals in Private Practice	PSI _{t-1}	Mental health professionals in private practice in Oregon counties per 10,000 population, F.Y. 1974-1975
31. Sub-Contract Agencies	SUB _{t-1}	Per capita aid to sub-contract agencies in Oregon counties in dollars, F.Y. 1974-1975
32. Mental Health Expenditures	ME	Per capita expenditures for county mental health programs in dollars, F.Y. 1974-1975
<u>Dummy Variables</u>		
33. Intercept Dummy	D1	D1 = 1, if county received federal staffing grant in F.Y. 1975-1976. D1 = 0 otherwise.
34. Slope Dummy for Unmh Term	D2	D2 = D1, times per capita non-matching mental health grants
35. Slope Dummy for Gmh term	D3	D3 = D2, times per capita matching mental health grants.

$$(39) \quad H_0: a_i = a_j \quad \text{for } i, j = 1, 2, 3; i \neq j$$

$$H_a: a_i \neq a_j$$

$$(40) \quad H_0: b_i = b_j \quad \text{for } i, j = 1, 2, 3; i \neq j$$

$$H_a: b_i \neq b_j$$

The parameter estimates for the grant functions will be estimated using ordinary least squares. These linear estimating equations can be written as:

$$(41) \quad G_s = C_0 + C_1 N_{t-1} + C_2 TR_{t-1} + C_3 POP_{t-1} + C_4 POPD_{t-1} \\ + C_5 INC_{t-1} + C_6 PSY_{t-1} + C_7 SUB_{t-1} + C_8 UNE + U_3$$

$$(42) \quad G_{mh} = D_0 + D_1 N_{t-1} + D_2 TR_{t-1} + D_3 POP_{t-1} + D_4 POPD_{t-1} + \\ D_5 INC_{t-1} + D_6 PSY_{t-1} + D_7 SUB_t + D_8 UNE + U_4$$

$$(43) \quad G_{nmh} = E_0 + E_1 N_{t-1} + E_2 TR_{t-1} + E_3 POP_{t-1} + E_4 POPD_{t-1} + \\ E_5 INC_{t-1} + E_6 PSY_{t-1} + E_7 SUB_{t-1} + E_8 UNE + U_5$$

The coefficient of determination (R^2) for each of these equations will be tested to see if it is significantly different from zero. This is equivalent to testing whether any of the regression coefficients are significantly different from zero. Generalizing the parameter labels in equations 41, 42, and 43 as B's, then we are testing:

$$(44) \quad H_0: B_1 = B_2 = B_3 = \dots B_8$$

$$H_a: B_1 \neq B_2 \dots B_8$$

As outlined before, the "output stage" of Oregon County budgeting consists of a series of interrelated decisions that result in the employment of skilled and lesser-skilled mental health staff at given salary levels, that determines the number of residents served by the staff and that culminates in the county department producing a given level of successful treatment. A corresponding system of simultaneous equations will be estimated using two-stage least squares (2SLS) and three-stage least squares (3SLS) estimation procedures.^{26/} Econometrically, this system can be expressed as:

$$(45) \quad L_p = F_0 + F_1N + F_2Gs + F_3Gmh + F_4Gnmh + F_5Wp + F_6W_{NP} + \\ F_7CB + F_8RES + F_9INC + F_{10}GU + F_{11}Gn + U_6$$

$$(46) \quad L_{NP} = G_0 + G_1N + G_2Gs + G_3Gmh + G_4Gnmh + G_5Wp + G_6W_{NP} + \\ G_7CB + G_8RES + G_9INC + U_7$$

^{26/} All of the equations are over-identified. When the structural equations of an econometric model are over-identified, the method of two-stage least squares is an appropriate method for overcoming the correlation of the error term and the endogenous variable caused by the simultaneity. The endogenous variables are regressed on all the independent variables in the first stage to remove the correlation. The predicted estimates for the endogenous variables are reintroduced into the structural equation for the second stage regression.

Three-stage least squares, a system method of estimation, is basically generalized least squares extension of the structural equations obtained from the second stage of a two-stage least squares estimation. Like the procedure for a set of seemingly unrelated regressions, three-stage least square estimation is justified when there is correlation among the disturbances of the different structural equations. An example of this would be the estimation of demand equations for different commodities. The transformation of the structural equations in the two-stage least process may have also led to non-constant error variance. It is argued here that because of the interrelated output decisions and because of the probability of omitted background information that affects all these equations, three-stage least squares is a legitimate procedure.

$$(47) \quad W_p = H_0 + H_1N + H_2L_p + H_3Gs + H_4Gmh + H_5Gmnh + J_6OWS + \\ H_7INC + H_8POPD + H_9PSY + U_8$$

$$(48) \quad W_{NP} = J_0 + J_1N + J_2L_{NP} + J_3Gs + J_4Gmh + J_5Gmnh + J_6OWS + \\ J_7INC + J_8POPD + J_9PSY + U_9$$

$$(49) \quad N = K_0 + K_1Gs + K_2Gmh + K_3Gmnh + K_4POP + K_5POPD + \\ K_6PSY + K_7SUB + K_8PS + K_9INC + U_{10}$$

$$(50) \quad Tr = L_0 + L_1L_p + L_2L_{NP} + L_3EOC + L_4N + U_{11}$$

As for the expenditure equations, a set of hypotheses will be tested concerning the regression coefficients for the Gs, Gmh, and Gmnh variables. Since no explicit level for the grant coefficients can be anticipated in the labor, wage, and client equations, the parameter estimates will be tested to see if they are significantly different from zero. In addition, the coefficients on the mental health variables will be tested in pairwise fashion to explore whether the grants differentially affect these endogenously determined factors.

The parameter estimates for the improvement-percentage function are, perhaps, the most critical to this research. If the L_p , L_{np} , or N coefficients are significantly different from zero, and if the mental health grants explained a significant portion of the variation in these variables, then a link exists between the grants and output. While imprecise, this can be translated into the output effects of mental health grants.

When possible, the 11 expenditure and output equations, including the improvement level function, will be estimated separately for the 13 eastern Oregon counties receiving the federal staffing grant and the re-

maining Oregon counties. The differences in the parameter estimates for these sub-populations will not be tested formally, using the Chow test,^{27/} because the staffing variable cannot be included in the western Oregon specifications. For those regressions in which it is not possible to separate the observations by region, an intercept dummy and two slope dummies have been included in the estimating equations. The intercept dummy takes on the value of 1 for the eastern Oregon counties and 0 for the remaining counties. The slope dummies were calculated for the Gmh and Gnmh variables.

Data Set

Data were collected from a number of sources, including the county audits and budgets and Oregon State Mental Health Division reports. A complete listing of the sources of information is available in Appendix II.

The intent originally was to collect data for 1974-1975 and 1975-1976 for all 36 Oregon counties. The 1974 data, however, were far too incomplete for certain variables, including staff levels for the county mental health departments and were consequently discarded. A reasonably complete set of observations for fiscal year 1975-1976 were available for only 31 of the 36 Oregon counties. The necessary expenditure, wage, and staff information could not be collected from the Lane, Multnomah, Clatsop, Columbia, and Crook County audits or budgets.

In collecting the data, a number of decisions were made that need to be mentioned here. The joint mental health programs for Gilliam and

^{27/} The Chow test can be used to test for the equality of coefficients in a model estimated for different data sets. The test statistic is F distributed and is based on the residual sum of squares for the two regressions. See Murphy, pp. 237-243.

Wheeler Counties and Wasco, Sherman, and Hood River Counties presented the problem of separating the mental health programs, grants, expenditures, and staffing for the individual counties. The judgment was made that the amount of local money a county gave to the program, in a sense, bought a level of expenditures, mental health grants, and staff. Though this was not as defensible in distributing the patients across the counties with joint programs, the same decision rule was used. The percentage of successful treatment was assumed the same for the joint county sponsors.

Expenditures were calculated for non-capital outlays. Only major investment items were omitted, though; mainly, capital construction funds. In addition, bond financed expenditures, tax pass-throughs, and expenditures for public service enterprises (hospitals, airports) that paid for their own operation were excluded.

As a final note, the average annual salaries for skilled and lesser-skilled staff included fringe benefits, payroll taxes, and other direct payroll expenses.

CHAPTER V

RESULTS

The purpose of this chapter is to present and discuss the regressions for the previously described econometric model of county budgeting in Oregon. Because of the imposing number of structural equations and an even greater number of regressions, the discussion has been purposely limited, with emphasis given to the findings from the regressions for:

- (1) the mental health expenditures demand function,
- (2) the skilled staff demand function,
- (3) the skilled staff supply function,
- (4) the client-user function, and
- (5) the treatment level function.

The discussion will center around the point estimates for the mental health grant coefficients and the corresponding tests of hypotheses outlined in the previous chapter. To a lesser extent, the narrative is concerned with the coefficients on the other explanatory variables, the overall descriptive ability of the model, and the influence of selected econometric violations, such as multi-collinearity, on the estimators.

The results are presented with a warning about the limitations in the data. Firstly, data could not be collected for five Oregon counties, including the two largest county providers of mental health services, Multnomah and Lane counties. Secondly, the observations for the joint eastern Oregon programs have been separated to derive observations for the individual counties. Throughout the discussion that follows, these two limitations should be considered.

Expenditure Stage: Expenditure Effects of
Mental Health Grants and Other Explanatory Variables

Table 10 presents the regression results for the mental health expenditure equation. The regression estimates are provided for three samples; the eighteen western Oregon counties, the thirteen eastern Oregon counties, and for all thirty-one counties. Based on the calculated F values, all three regressions were significant at a ninety-five percent confidence level. In equation 10.1, the regression on the complete data set, the point estimates for Gs (1.038), Gmh (1.3755), and Gnmh (1.004) were positive and significantly different from zero.^{1/} (None were significantly different from one.) Counties that received a comparatively greater amount of each type of aid tended to spend more for mental health expenditures, ceteris paribus, in fiscal year 1975-1976. Though it cannot be validated, the results also suggest that a dollar of the mental health grants per capita led to about a dollar increase in mental health expenditures per capita for the average county program. Thus, the grants were, in Gramlich's terminology, partially stimulative. The pairwise tests for the equality of the coefficients for the mental health grant variables showed that there were no significant differences in the estimates.^{2/}

^{1/} The test statistic $\frac{b_i - b^*}{s_{bi}}$ has approximately a t distribution with

$N - k$ degrees of freedom, where b_i is the parameter estimate, b^* is a designated value for the coefficient, s_{bi} is the standard error of the estimate, N is the number of observations and k is the number of explanatory variables.

^{2/} The test statistic, $\frac{\bar{X}_i - \bar{X}_j}{\sqrt{\sigma_i^2 + \sigma_j^2 - \partial\sigma_{ij}}}$; $i \neq j$, has approximately a t

distribution with $N = k$ degrees of freedom.

Table 10. Estimated Parameters for Mental Health Expenditure Equations:
 Dependent Variable is Per Capita Expenditures for Mental Health Services (EMH), 1975-1976

Equation	GS	GMH	GNMH	GU	GN	INC	RE5	CB	CONSTANT	Adj. R ²	F	D-W	Sample: Estimation Procedure
10.1	1.038*** (.0766)	1.3755*** (.316)	1.004*** (.191)	.012 (.011)	-.003 (.0075)	.00021* (.00012)	2.566 (1.832)	.0046 (.0039)	-1.513 (1.182)	.90	34.63***	1.58	31 Oregon Counties; O.L.S.
10.2	- -	2.232*** (.385)	1.671*** (.400)	.0253** (.01)	-.0009 (.008)	.00026* (.00018)	-3.267* (2.149)	-.011 (.0065)	-1.066 (1.189)	.835	13.30***	2.06	18 W. Oregon Counties; O.L.S.
10.3	1.411*** (.244)	.313 (.481)	.9575*** (.222)	-.0277 (.057)	.003 (.013)	.0002 (.00015)	4.143 (3.305)	.0075 (.0054)	-1.965 (2.366)	.85	9.57**	3.056	13 E. Oregon Counties; O.L.S.

STANDARD ERRORS in parentheses.

* = Significant at 90 percent confidence level.

** = Significant at 95 percent confidence level.

*** = Significant at 99 percent confidence level.

One-tailed test run for GS, GMH, GNMH, INC, RE5; two tailed tests for remaining variables.

O.L.S. = Ordinary Least Squares.

D-W = Durbin-Watson Statistic.

Multicollinearity tests suggest that the conditional grants (Gn), cash balances (CB) and mental health matching grant (Gmh) variables were affected by multicollinearity.^{3/} Correction procedures were not used to lessen the dependency relationship among these variables. In addition, no appreciable signs of heteroskedasticity^{4/} or autocorrelation^{5/} were present in the equation.

The western Oregon regression had a similar pattern of results (equation 10.2). Both the Gmh and Gnmh variables were found to be significantly related to mental health expenditures. For the average western Oregon county in 1975-1976, a per capita dollar of matching and non-matching mental health aid was associated with a two dollar and twenty-three cent and one dollar and sixty-seven cent increase in per capita county spending for mental health services. The point estimate for the matching grant

^{3/} Multicollinearity is the problem of the high correlation among the explanatory variables. The major effect of multicollinearity is that the variance of the parameter estimates are increased. While the estimates are unbiased, they are sensitive to changes in the data or specification (Murphy, 1973, p. 371).

Initially, the degree of multicollinearity was measured by the variance inflation factor (V.I.F.) which is calculated by inverting the correlation matrix and reading off the main diagonal elements. The effect of multicollinearity on the separate variables was then formally tested using an F statistic. See Murphy, p. 380, for details of the test.

^{4/} Heteroskedasticity exists when the assumption of the constant error variance is violated. This problem biases the variance of the estimated regression coefficient. A Goldfeld-Quandt test was run to test for possible heteroskedasticity (Murphy, 1973, p. 305).

^{5/} Autocorrelation occurs when the error terms move together in a systematic fashion. Autocorrelation results, generally, in an inflated standard error of the estimate and an inflated standard error of a parameter estimate.

The observations for the regression were ordered to account for the possibility of a spatial autocorrelation. That is, counties in a particular region of the state might be affected by the same omitted factors.

The possible presence of autocorrelation was examined using the Durbin-Watson Statistic.

term was significantly different from zero, suggesting, at least, a partial stimulation. The point estimate for the Gnmh variable, though not significantly different from one, does provide tentative evidence that the non-matching grants were not diverted into tax relief or increased spending for other county services as predicted by the utility maximization model of local fiscal choice. The grant coefficients were tested to see if there was a significant difference in their value, but none was found.

The parameter estimate for the unconditional grant variable also showed that unconditional grants and mental health expenditures were significantly correlated. Western Oregon counties that received a greater amount of unconditional aid per capita tended to spend more per capita on mental health services, ceteris paribus. Alternatively, the results suggest that an additional dollar of the unconditional aid per capita stimulated local government spending per capita by about two and one-half cents.

In equation 10.3, the results from the regression for the eastern Oregon counties are presented. Surprisingly, the results imply that the matching health grants received by the eastern Oregon counties were not significant determinants of mental health spending. This might be explained by the data manipulation mentioned before. The marginal expenditure effect of a dollar of the federal staffing aid per capita was estimated to be about a dollar and forty cents. This point estimate was not significantly different from zero, however. In contrast to their purported effect on spending in western Oregon, the non-matching mental health aid had a mildly "substitutive" effect on spending by eastern Oregon counties (.96). In other words, the estimated coefficient provides evidence for the argument that this type of aid was, in small part,

substituted for tax dollars previously spent on mental health programs.^{6/}

Little can be said, unfortunately, in a comparison of the estimates reported in the eastern and western Oregon county regressions. Except for the G_{mh} term in equation 10.3, the estimated coefficients for the grant variables were positive and significant. It appears, based on the point estimates solely, that the eastern Oregon counties were comparatively thrifty with their general fund revenue; matching the staffing grant at the legally mandated rate and expanding their program expenditures by the exact amount of the non-matching aid. In contrast, an argument could be advanced that the mental health grants were an impetus, for any number of reasons, to an expansion of the mental health programs and expenditures in western Oregon. But, these interpretations were tentative at best until further research is conducted.

A corollary set of regressions were run to estimate the effect of mental health grants on county spending for all other services. The results, reported in Appendix IV, suggest that the grants were not significant determinants of spending in eastern or western Oregon counties. Not one of the point estimates for the grant variables were statistically different from zero in any of the three regressions. If anything, the regressions are distinguished by the marked difference in the ability of the proposed demand function to explain the variations in per capita spending for non-mental health services in western Oregon as compared to eastern Oregon. The adjusted R^2 for the western Oregon regression was .95. In contrast, the adjusted R^2 reported for the eastern Oregon regression was not significantly different from zero.

^{6/} There was not a significant difference in the estimates.

The final component of the expenditure stage analysis consisted of the estimation of the separate grant equations (see Appendix IV). Individual regressions were, again, run for the three different data sets. The explanatory ability of the model varied, by sample, when non-matching mental health aid was the dependent variable. The western Oregon regressions, though not significantly affected by the presence of the standard econometric problems, implied that none of the predetermined variables hypothesized to explain the amount of aid received were, in fact, correlated with the dependent variable. Accordingly, the F test for the significance of the regression line was not significant at the ninety-five percent confidence level. The regression for the eastern Oregon county sample, in comparison, had an adjusted R^2 of .87. The unemployment rate (-.42), the county population in the previous year (.000087), and the treatment success rate in the previous year (-.054) were significantly correlated with the variable for non-matching mental health aid. The sign and magnitude of the population coefficient were within anticipated bounds. The estimate suggests that for every 10,000 persons in a community, about 87 cents in non-matching health aid per capita was received. The signs on the coefficients for the other two variables ran opposite to those anticipated. There is no ready explanation for either of these estimates. Perhaps, in the one case, the type of number of clients that benefitted from the services or programs earmarked for the non-matching aid subsidy are associated with a lower rate of successful treatment. In the second case, the negative unemployment estimate may imply that an omitted factor, such as the predisposition of county residents to mental health care, might be correlated with the unemployment rate. All in all, the results of the eastern Oregon

county regression, coupled with the estimates from the western Oregon regression, indicate that there were additional variables, omitted in this analysis, that influenced the level of non-matching aid dispensed.

The findings from the regressions here matching aid per capita was the dependent variable were the near mirror-image of those where non-matching aid was the dependent variable (Appendix IV). For a sample of the eastern Oregon counties, the results indicate that only POP_{t-1} was significantly correlated with per capita matching aid, ceteris paribus (-.000082). A test of the null hypothesis that the regression R^2 was equal to zero could not be rejected. In contrast, the linear regression model appears to explain successfully the per capita amount of matching aid received by the western Oregon counties. The results indicated that the per capita expenditures for mental health programs in the previous year (.309), the per capita county income in the previous year (.000136), the unemployment rate (.271), and population (.000016) were positive determinants of the per capita amount of matching aid received in fiscal year 1975-1976 and that, as anticipated, the number of mental health professionals in private practice (-1.16) was a negative determinant of the dependent variable. In addition, the negative signs on N_{t-1} and Tr_{t-1} , variables significant at ninety percent confidence levels, may indicate that the programs with chronic long-term patients received more matching grant money.

The linear regressions of the staffing grant (Gs) function are presented in Table 18 in Appendix IV. The adjusted R^2 for the eastern Oregon regression was .83 due, mainly, to the strong association between the per capita expenditures for mental health programs in the previous year and the per capita dollar amount of staffing aid. The marginal

effect of a dollar of spending in the previous year was estimated to be about forty-eight cents. The parameter estimates for the other explanatory variables were not significantly different from zero.

Since the staffing grant was found to be a significant determinant of spending, it appears that the amount of staffing aid appropriated in one time period is dependent on the amount of aid appropriated in the previous time period.^{7/} This is not surprising, though, because it is virtually equivalent to saying that current year expenditures are systematically related to the previous year's expenditures. The importance of the statement lies in the fact that the matching rate mandated by the staffing grant changes from year to year. Thus, if the specification is correct, the average eastern Oregon county was willing to bargain for an increased amount of staffing aid though it required an increase in the own fund outlay from the previous year. Certainly, there may be other explanations. For example, the counties may have matched the staffing aid with the unused portion of the aid received in the previous year. Or, the federal overseers of the staffing grant program may have appropriated aid on the basis of critical program needs for a particular group of patients.

Output Stage: The Derived Demand for
Skilled and Lesser-Skilled Mental Health Employees^{8/}

Table 11 reports the results from the linear regressions for the

^{7/} This same pattern exists in western Oregon with the matching aid.

^{8/} The SPSS two-stage least squares sub-program reports only the t values for the estimated regression coefficients. With further manipulation, it was possible to derive the standard errors of the separate estimates. No other statistics were provided. Only the three-stage least squares estimates will be discussed in the following section because of the additional information gained in this estimation procedure.

Table 11. Estimated Parameters for Specialized Staff Equations: Dependent Variable is Full Time Equivalent Mental Health Employees with Specialized Training per 10,000 Residents (LP), 1975-1976

Equation	GS	GMI	GMMH	GU	GN	WP	WNP	N	INC	RES	CB	D ₁	D ₂	D ₃	CONSTANT	Sample; Estimation Procedure
11.1	.493*** (.0527)	.635** (.275)	.3275** (.142)	.0156 (.0095)	.002 (.006)	-.000126 (.00014)	.0000125 (.00029)	-.00013 (.00045)	.000028 (.000086)	1.655 (3.259)	-.0040 (.0025)	-	-	-	1.3675 (1.935)	26 Oregon Counties; 2SLS
11.2	.482*** (.052)	.556** (.257)	.341** (.138)	.0101 (.0081)	.00058 (.0045)	-.000137 (.000128)	-.000044 (.00028)	-.00022 (.0004)	.000031 (.000052)	2.255 (2.722)	-.00226 (.0021)	-	-	-	1.76 (1.636)	26 Oregon Counties; 3SLS
11.3	-	1.201*** (.3405)	.568** (.265)	.0208** (.0085)	.00214 (.0047)	-.00019* (.00010)	.000106 (.000155)	.00021 (.00032)	-.00006 (.000097)	-2.997 (3.095)	-.0094 (.0049)	-	-	-	2.478 (1.456)	16 W. Oregon Counties; 2SLS
11.4	-	1.254*** (.285)	.670** (.247)	.0227** (.0077)	.0046 (.0033)	-.00024** (.000081)	.00013 (.00012)	.00041 (.00026)	-.000025 (.000091)	-4.189 (2.388)	-.0102** (.0039)	-	-	-	2.850 (1.097)	16 W. Oregon Counties; 3SLS
11.5	.720*** (.183)	.753*** (.274)	.306 (.242)	.015 (.009)	-.0018 (.0065)	-.000094 (.00014)	-.00014 (.00027)	-.00014 (.00043)	.0000086 (.00009)	2.40 (3.14)	-.0023 (.0029)	-.041 (1.26)	-.0053 (.32)	-.56 (.43)	1.85 (2.015)	26 Oregon Counties; 2SLS
11.6	.722*** (.165)	.762*** (.229)	.364* (.230)	.0072 (.0073)	-.0011 (.0043)	-.00013 (.00011)	-.00009 (.0002)	-.000028 (.00037)	.000014 (.000086)	1.23 (2.45)	-.0013 (.0020)	-.33 (1.13)	-.106 (.295)	-.621* (.418)	2.36 (1.55)	26 Oregon Counties; 3SLS

STANDARD ERRORS in parentheses.

* = Significant at 90 percent confidence level.

** = Significant at 95 percent confidence level.

*** = Significant at 99 percent confidence level.

One-tailed test for GS, GMI, GMMH, WP; two-tailed test for remaining variables.

2SLS = Two Stage Least Squares

3SLS = Three Stage Least Squares

specialized staff function. Six different regressions are reported for two different samples (26 counties; 16 western Oregon counties) and two different estimation procedures (two-stage and three-stage least squares). In total, mental health grants were found to be significantly correlated with the number of skilled staff employed by the counties. In a sample of twenty-six counties, the three-stage least square estimates for G_s , G_{mh} , and G_{nmh} were .482, .556, and .341, respectively (Equation 11.2); all were significant at a ninety-five percent confidence level. Thus, counties with greater per capita mental health aid tended to employ more skilled staff per 10,000 residents, ceteris paribus. A test of the difference in the coefficients showed that there were no significant differences in the aid coefficients.

The results reported in Equation 11.6 were similar, though the point estimates for G_s , G_{mh} , and G_{nmh} were higher (.724, .762, and .369). Again, there was no significant difference in the estimates. Though the signs were negative as anticipated, the wage (W_p) coefficients in Equations 11.2 and 11.6 were not significantly different from zero. The mix of psychiatrists, psychologists, and social workers comprising the skilled staff variable may differ sufficiently among counties that there is no statistical relationship between the aggregated wage term and the aggregated labor variable. None of the remaining variables were correlated with the number of skilled staff in either equation. In particular, the dummy estimates were insignificant.

For the sample of western Oregon counties, the point estimates of the effect of aid were higher than in 11.2 and 11.6. The results indicate that an additional dollar of matching aid per capita was directed into the employment of 1.25 full-time employees with specialized training per

10,000 residents. Similarly, the marginal "skilled staff" effect of a dollar of non-matching aid was estimated to be .67. These estimates were not significantly different from one another, however.

It appears that unconditional grants, which previously had been reported to affect the spending for mental health services in western Oregon, were also directed into the employment of skilled staff (.0227). In addition, the results imply that the average annual salary for skilled staff was negatively related to the number of employees (-.00024), providing evidence for a downward sloping derived demand curve.

The identical set of explanatory variables was used to derive a statistical demand curve for non-professional staff (Appendix IV). The three-stage least square regressions for a sample of 26 Oregon counties shows that not one of the estimated regression coefficients, including the parameter estimates for the mental health aid and the average annual salary variables, were significantly different from zero. When dummy variables were included in this specification, the parameter estimates changed slightly but again were not statistically significant. The results from the regression for a sample of 16 western Oregon counties suggest that both matching and non-matching mental health grants were correlated with the number of lesser-skilled staff employed by the counties, ceteris paribus. An additional dollar of matching and non-matching mental health aid per capita was associated with a 1.384 and .654 person increase in the number of full-time equivalent staff without specialized skills per 10,000 county residents. Despite the differences in the point estimates, the coefficients for Gmh and Gnmh were not significantly different from one another. The estimated regression coefficients for per capita county income (.000197) and per

capita cash balances (-.013) were also significant, but none of the remaining parameter estimates, including the estimated salary coefficient, were found to be statistically different from zero.

These particular findings are questionable in light of the probable misspecification of these equations, the weaknesses in the data (including the aggregation of the specialists), and econometric violations. These problems, or some subset of these problems, were prevalent in some of the remaining regressions, as well.

Output Stage: Average Annual Salary
for Mental Health Staff

Table 12 provides the results from the regressions for the function purporting to explain the average annual salary for staff with specialized skills. The results from Equations 12.2 and 12.6, the regressions for the 26 county sample, suggest that additional matching aid was used partly to increase salaries. An additional dollar of matching aid per capita was associated with an increase of \$2,173.096 and \$3,010.98 in average salaries. Previously, we had seen that the matching grants, for the same set of observations, were significantly correlated with the number of skilled staff employed. And, as mentioned before, this type of aid is earmarked for clinics, halfway houses, and detoxification centers. Together, the findings on the effect of matching aid provide tentative evidence that as these particular county programs grow there is a switch in the mix of staff skills; for example, higher paid psychiatrists may be substituted for psychologists or other mental health specialists. Alternatively, though, the county clinics with more staff might be paying higher salaries for the same skill levels.

Table 12. Estimated Parameters for Wage Equations for Specialized Staff: Dependent Variable is Average Annual Earnings for Mental Health Staff with Specialized Training (WP), 1975-1976

Equation	Lp	N	GS	GMI	GMMI	OVS	POPD	PSY	INC	D ₁	D ₂	D ₃	CONSTANT	Sample; Estimation Procedure
12.1	-1683.96 (1931.11)	.295 (1.184)	987.594 (847.519)	1627.109* (1147.213)	81.879 (763.492)	1.714** (.71)	-16.337 (15.820)	-1369.89 (2641.81)	.604* (.383)	-	-	-	4961.97 (5035.68)	26 Oregon Counties; 2SLS
12.2	-2575.66 (1787.15)	.220 (1.167)	1340.647* (792.141)	2173.096** (1087.276)	598.172 (722.299)	1.265** (.654)	-8.506 (12.884)	-1060.890 (2505.726)	.454 (.376)	-	-	-	7720.38 (4817.14)	26 Oregon Counties; 3SLS
12.3	-2199.388 (4093.78)	2.407 (1.89)	-	2597.49 (2194.28)	-1484.72 (2579.45)	1.723 (1.734)	-10.536 (23.673)	-3593.59 (3939.25)	.191 (.771)	-	-	-	6421.43 (11,400.48)	16 W. Oregon Counties; 2SLS
12.4	-2426.515 (3215.88)	2.863 (1.807)	-	2861.248* (2014.55)	-1909.865 (2240.48)	1.934 (1.425)	-11.583 (19.435)	-4203.606 (3448.045)	.187 (.751)	-	-	-	5426.51 (9856.096)	16 W. Oregon Counties; 3SLS
12.5	-2431.16 (2709.75)	.825 (1.44)	2155.17 (2279.04)	2139.45 (1685.61)	-428.23 (1448.98)	1.626** (.895)	-16.94 (17.23)	-1950.33 (2907.27)	.54 (.43)	-3874.2 (6663.77)	887.03 (1477.43)	-1108.5 (2678.61)	6453.36 (6133.32)	26 Oregon Counties; 2SLS
12.6	-3473.18 (2449.25)	.799 (1.39)	2833.58* (2082.08)	3010.98** (1512.27)	585.90 (1343.18)	1.088 (.816)	-4.90 (13.367)	-1881.09 (2370.17)	.374 (.426)	-2554.40 (6444.86)	116.20 (1426.26)	-2307.02 (2502.84)	8620.45 (5900.69)	26 Oregon Counties; 3SLS

STANDARD ERRORS in parentheses.

* = Significant at 90 percent confidence level.

** = Significant at 95 percent confidence level.

One-tailed test for Lp, GS, GMI, GMMI, OVS; two-tailed test for remaining variables.

2SLS = Two Stage Least Squares

3SLS = Three Stage Least Squares

The estimates of the wage effects of non-matching aid were not statistically significant in these regressions. It appears that the non-matching aid did not foster higher wages. The estimates for the staffing grant (1,340.647 and 2,833.58) were significant at the 90 percent confidence level. Despite the wide differences among the estimates for the mental health grant variables, there were no statistical differences in the estimates.

Of the remaining explanatory variables, only the average salary in the service sector was found to be systematically related to the average salary for skilled staff. An additional dollar of this "opportunity" salary was associated with an increase of a dollar and twenty cents in the professional staff salaries (Equation 12.2). The labor variable (L_p) was not significantly correlated with W_p suggesting that the salary levels were not determined in the budget process. This, of course, might be explained by weaknesses in the data or the model specification.

In the regressions for a sample of western Oregon counties, only the matching aid estimate was significant at a ninety percent confidence level. The wage effect of an additional dollar of matching aid per capita was estimated to be \$2,861.248.

When the same set of explanatory variables were regressed on the average salary for non-professional staff, the pattern of findings was similar (see Appendix IV). For the counties as a whole, staffing grants and non-matching grants had no apparent effect on salary levels. The estimate of the wage effects of matching grants was significant, though, indicating that dollar of matching aid per capita resulted in an \$890 increase in the average salary for non-professional staff. In addition, there was a statistically significant difference in the wage effects of

staffing grants as opposed to the matching aid. The average salary in the service sector was again found to be significantly correlated with the salary levels (.506). And, as before, the labor variable and the other explanatory variables were not correlated with the average salary amounts.

In the western Oregon county regression, none of the explanatory variables appear to have influenced the salary level for lesser-skilled staff. Specifically, none of the matching and non-matching aid received by the western Oregon counties appears to have not been related to salary levels.

Output Stage: Client-User Equations

Table 13 reports the results from regressions for the proposed client-user functions. In Equations 13.2 and 13.6, the estimate for the non-matching aid variable, G_{nmh} , was found to be significant at the 90 percent confidence level. Based on the point estimates, an additional dollar of non-matching aid per capita was associated with a 238 and 365 person increase in the number of patients seen. The staffing grant and matching aid coefficients, in contrast, were not significantly different from zero. These comparative findings might be explained by the service conditions attached to these grants. Since the staffing and matching aid largely underwrite the costs of clinics, this money is probably filtered through to a particular client group, say the mentally and emotionally disturbed. Because of prevailing treatment practices, the grant per patient ratio may be quite high. In contrast, the non-matching aid funds specific programs, such as parent training, that can or have served a larger number of patients per staff member. An increase of non-matching aid would logically result in a greater total number of patients served.

Table 13. Estimated Parameters for Client-User Equations: Dependent Variable is Number of Patients Served by Oregon County Mental Health Programs (N), 1975-1976

Equation	GS	GMI	GNMI	POP	POPD	PSY	SUB	INC	PS	D ₁	D ₂	D ₃	CONSTANT	Sample; Estimation Procedure
13.1	.701 (68.165)	262.25 (223.491)	241.179* (144.319)	.021*** (.0065)	-9.159* (4.753)	-191.29 (725.44)	3.043 (48.935)	-.0527 (.0879)	1588.62 (1799.98)	-	-	-	988.548 (1593.121)	26 Oregon Counties; 2SLS
13.2	6.752 (61.89)	216.452 (208.078)	237.627* (139.353)	.0193*** (.0061)	-8.893* (4.242)	-146.587 (666.244)	-24.524 (38.714)	-.085 (.086)	1573.61 (1736.64)	-	-	-	-645.72 (1328.94)	26 Oregon Counties; 3SLS
13.3	-	-118.939 (254.121)	447.025** (176.892)	.0125** (.0052)	-10.638** (3.344)	870.15 (522.59)	-104.75 (79.316)	.0062 (.104)	-2385.81* (1147.20)	-	-	-	1721.44 (1160.44)	16 W. Oregon Counties; 2SLS
13.4	-	-242.468 (218.134)	467.958** (169.559)	.011** (.0044)	-10.883*** (2.803)	844.938* (431.42)	-144.4** (61.96)	.262 (.380)	-2742.47** (987.62)	-	-	-	2331.30 (963.01)	16 W. Oregon Counties; 3SLS
13.5	-282.65 (215.69)	254.00 (300.62)	321.468 (265.317)	.0204*** (.007)	-8.80* (4.96)	-118.70 (730.69)	30.194 (52.90)	-.031 (.102)	1862.39 (1776.33)	1335.69 (1481.61)	-161.82 (327.58)	186.41 (548.04)	-1327.01 (1418.67)	26 Oregon Counties; 2SLS
13.6	-298.28 (197.10)	257.25 (268.77)	364.71* (258.33)	.019*** (.0064)	-7.04 (4.14)	-252.91 (598.94)	11.77 (41.17)	-.065 (.10)	2032.23 (1619.80)	1605.61 (1390.86)	-228.28 (327.97)	113.89 (523.23)	-1330.95 (1269.85)	26 Oregon Counties; 3SLS

STANDARD ERRORS in parentheses.

* = Significant at 90 percent confidence level.

** = Significant at 95 percent confidence level.

*** = Significant at 99 percent confidence level.

One-tailed test run for GS, GMI, GNMI, POP; two-tailed test for remaining variables.

2SLS = Two Stage Least Squares

3SLS = Three Stage Least Squares

This is borne out further in Equation 13.4, the three-stage least squares regression for the sample of western Oregon counties. The estimate of the client effect of non-matching aid (467.96 patients) was significant, while the parameter estimate for matching aid term was not.

In addition, the estimated regression coefficients for population (.01), population density (-10.88), private practicing professionals (844.94), sub-contract agencies (-144.4), and the percent of professional staff (-2,742.47) were significantly different from zero in this regression. The negative correlation between population density and the number of client-users of the counties was unanticipated. The population density term was included originally as a catchall variable that would represent the stress of the urban environment and measure the community acceptance of mental health care. Instead, it appears that population density acts as a sponge for a much different set of factors. The less densely populated counties tend to have fewer private providers of mental health services. Moreover, the parameter estimate for SUB was negative, implying that clients did perceive the private clinics as substitutes for the county clinics. Thus, the mental health programs in the less densely populated counties are monopoly providers and the main source of treatment for the mentally and emotionally disturbed. There may be, in addition, a kind of information effect. The rural county programs, as sole providers of treatment, may have a greater visibility. County residents in rural counties are not faced with a bewildering array of public and quasi-public governments and private agencies. Indeed, the county government tends to be the dominant government unit. The search for services, including treatment to mental illness, requires mainly a call to the county seat.

While population density was originally thought to be a measure of a community's acceptance of mental health services, it appears that the private practitioners variable (PSY) served this role. Counties differ as to the relative stigma attached to mental illness by its residents. Those counties in which mental health professionals can make a living in private practice are likely to have a greater aggregate demand for mental health services.

The estimate of the client effect of a change in the percentage of skilled staff for a county mental health program suggests that (1) either the degree of "professionalism" of the county staff influenced the resident's decision to seek out care (e.g., a client would rather be treated by an aide than a psychiatrist) or (2) that the lesser-skilled staff were employed in specific programs that treated a greater number of patients. Probably, this latter interpretation is correct.

Output Stage: Improvement Level Function^{9/}

The dependent variable for the regressions reported in Table 14 is the percentage of patients considered "improved" when they leave the county programs. The results suggest that either this was a flawed measure of output or that the traditionally assigned inputs of labor, capital, and materials -- as specified in this equation -- did not affect

^{9/} Regressions 14.5 and 14.6 were derived from the system of equations in which dummy variables were included in the client-user, staff, and salary equations.

As mentioned earlier, Tr is a qualitative dependent variable. The importance of this was not known to the author until the research had been virtually completed. A logit form of the variable, $LN \frac{Tr}{100 - Tr}$, was introduced into the system of equations and the output stage parameters were re-estimated. Surprisingly, the results were, basically, the same. Often the parameter estimates were identical for the two sets of regression. Intriligator (1978, p. 174) notes, though that the disturbance term for the logit form exhibits heteroskedasticity. This could not be corrected for.

Table 14. Improvement Level Function: Dependent Variable is Percentage of Patients Considered "Improved" When They Left the County Mental Health Program (TR), 1975-1976.

Equation	LF	LNP	EOC	N	CONSTANT	Sample; Estimation Procedure
14.1	1.94 (2.835)	4.39 (4.31)	-.00107** (.00047)	.0018 (.0046)	25.630*** (8.813)	26 Oregon Counties; 2SLS
14.2	2.186 (2.810)	4.62 (4.24)	-.0011** (.00046)	.0028 (.0045)	24.14** (8.77)	26 Oregon Counties; 3SLS
14.3	5.55 (7.94)	.634 (6.21)	-.00073 (.00074)	-.0015 (.0056)	24.83* (12.30)	16 W. Oregon Counties; 2SLS
14.4	5.85 (7.48)	1.42 (6.135)	-.000708 (.00067)	-.00072 (.0055)	22.49* (12.06)	16 W. Oregon Counties; 3SLS
14.5	2.218 (2.67)	5.31 (3.77)	-.00104** (.00045)	.00116 (.0044)	26.88*** (8.59)	26 Oregon Counties; 2SLS
14.6	2.451 (2.664)	3.663 (3.747)	-.00109** (.00045)	.00215 (.00435)	25.45 (8.55)	26 Oregon Counties; 3SLS

STANDARD ERRORS in parentheses.

* = Significant at 90 percent confidence level.

** = Significant at 95 percent confidence level.

*** = Significant at 99 percent confidence level.

Two-tailed test for all variables.

2SLS = Two Stage Least Squares

3SLS = Three Stage Least Squares

the percentage of successful treatment. For the 26 counties combined (Equations 14.2 and 14.6), only material and capital expenditures per capita were systematically related to the improvement percentage. A negative coefficient was estimated in both regressions (-.0011; -.00109). As material and capital expenditures per capita increased, the percentage of patients labeled improved declined. This seemingly nonsensical finding is best explained by the fact that the amount of material expenditures by a county is dependent on the types of services provided and the types of patients served. Thus, if counseling services make up the bulk of services offered, material and capital expenditures, correspondingly, are probably a small portion of total input payments and the percent of improved patients may be relatively high. If, on the other hand, the county operates a sheltered workshop for the mentally retarded or a detoxification center, material and capital expenditures are higher and the likelihood of successful treatment is lower.

More importantly, the parameter estimates for L_p , L_{np} , and N were not statistically different from zero in these regressions. Based on these results, there is no apparent link between the mental health grants and this treatment measure for mental health services. These results, it is argued in the next section, are the result of misspecification, though.

An Overview of the Output Stage Analysis

Throughout the discussion on the output stage regressions (Tables 11, 12, 13, and 14), a concern has been expressed about the seeming inability of the linear sets of independent variables to explain the variations in the dependent variables for particular samples. In some cases,

such as in the client-user and skilled-staff regressions, it appears that the joint eastern Oregon county programs may have affected the results. This would explain why a number of the independent variables were significant in the regressions for the sample of western Oregon counties, but few or none were significant in the regressions for the sample of all available counties. In other cases, econometric violations may have existed that could not be tested for. More importantly, there are two larger factors, in some sense findings, that may explain some of the regression results and that are worthy of further investigation. The first relates to the way researchers have traditionally differentiated grant types. The second relates to the production function for mental health services.

The grants that are earmarked for particular services generally have been designated as conditional grants and combined into a single variable, accordingly. The problem with the single categorization is that, as in the case for the mental health grants, the conditional grants may fund many different program elements for the same service. The additional conditions attached to the grant, not accounted for in the broad classification, can generate a wide variety of incentives to local governments. For example, the non-matching mental health aid is dispensed for over ten specific mental health programs. Because of treatment practices, each program is staffed with employees with a certain type of skills at a corresponding salary level. In turn, the number and type of patients cared for differs from program to program. And, finally, as discussed before, the probability of successful treatment probably varies among programs. Thus, though it could not be done for this study, a greater disaggregation of the conditional mental health

grants may be necessary to examine the full effects of the grants. Similarly, this may be true for grants appropriated for other services as well.

The aggregation of programs is one of several possible reasons why the estimated "production function" for mental health services for this study (Table 14) implied that labor inputs did not affect the percentage of improved patients. The programs can be considered as intermediate outputs produced by the transformation of labor, material, and capital inputs. The mix of programs, then, may determine the level of successful treatment.

Backing up a step, though, the output measure developed for this study may be flawed. The number of persons who left the program was only a subset of the total number of persons who received treatment that year. There was no comparable measure for the persons who remained under the care of the county's staff. In addition, it was impossible to distinguish among the patients who left the program, either by the type or severity of problem. Also, improvement is a subjective measure that would differ from county to county. If the data are available, much greater attention must be given to the development of an output measure, or measures, for mental health services.

Moreover, we must consider the nature of the production function for county mental health services. The probability of successfully treating a given individual depends as much on the particular character and attitudes of that individual and the physical and social support in the community as a whole as it does the specifics of the county treatment practices. In addition, the mental health administrators may not be as myopic in their concerns as these equations suggest. They are probably

concerned with the mental health of all individuals in a community and not merely those who seek out treatment. Accordingly, the social environment and the community-wide inputs into mental health care may be significant variables in the county production function.

CHAPTER VI

SUMMARY OF FINDINGS AND SUGGESTIONS FOR FUTURE RESEARCH

Summary of Findings

The central question posed in this study, as stated earlier, was: how do the different types of mental health grants affect the Oregon counties' budgeting and production decisions? The theoretical framework constructed to answer this question allowed us to focus on some specific issues: (1) the expenditure effects of grants; (2) the salary effects of grants; (3) the employment effects of grants; (4) the determinants of grant participation; (5) the effects of grants on the number of resident-users; and (6) the output effects of grants. Many of these issues have not been addressed in previous research. Using regression analysis, the findings about these issues were derived from observations for 31 Oregon counties in the fiscal year 1975-1976.

Expenditure Effects of Grants

- Previous theoretical and empirical studies have suggested that grants are a positive and significant determinant of state and local government spending. In this study, mental health grants were found to be a significant determinant of Oregon counties' spending for mental health services in fiscal year 1975-1976.
- The Utility-Maximization and Budget-Maximization models of local fiscal choice offer the prediction that conditional matching aid would tend to stimulate the spending for the aided service. The prediction has been substantiated in past empirical studies. The

results from this study indicate that the federal staffing grant and the state's matching grant at least partially stimulated spending for mental health services.

- For a sample of 31 Oregon counties, the results suggest that the staffing grant had a marginal expenditure effect of \$1.03. This point estimate was not significantly different from one, though. For a sample of the 13 eastern Oregon counties that received the staffing grant, the point estimate for the staffing grant variable was \$1.41. Again, this estimate was not significantly different from one.
- The findings from this study indicate that a one dollar per capita increase in the state's matching aid resulted in a \$1.37 increase in per capita spending for mental health services by all 31 counties in fiscal year 1975-1976. In the western county regression, the point estimate of the effect of an additional dollar of matching aid per capita was \$2.23. This estimate was found to be significantly different from one. In contrast, matching aid appeared to have no effect on the expenditures for mental health programs in eastern Oregon.
- The Utility Maximization and Budget-Maximization models offer differing predictions about the expenditure effects of conditional non-matching aid: the former suggests that the partial derivative of expenditures with respect to aid would be less than one; the latter suggests that the same partial derivative would be greater than one. The contradictory findings from past studies neither

confirm not reject either hypothesis. The results from the regressions for the different data sets indicate that the non-matching mental health grants were significantly associated with spending. None of the point estimates -- 1.004 (31 counties), 1.67 (18 western Oregon counties), .96 (13 eastern Oregon counties) -- were significantly different from one.

- Previous empirical studies were not in agreement as to the effects of grants on other local service expenditures. The results from this study imply that none of three types of mental health grants significantly affected county expenditures for non-mental health services in fiscal year 1975-1976.
- In western Oregon, unconditional grants were positively associated with the counties' spending for mental health services.

Factors Affecting the Amount of Grants Received by a County

- The per capita amount of non-matching mental health grants received by 13 eastern Oregon counties in fiscal year 1975-1976 appears to be positively related to the county population in the previous year (.000087) and negatively related to the percentage of mental health considered improved in the previous year (-.054) and the county unemployment rate in the previous year (-.42). None of the independent variables were significantly correlated with non-matching mental health aid in the western Oregon county regression. For the combined sample of 29 counties, the results indicated that the amount of variation explained by the independent variables was not significantly different from zero. The estimates for Tr_{t-1} (-.029) and

UNE (-.394) were significant at the 95 percent confidence level, however.

- For a sample of 13 western Oregon counties, only county population in the previous year (-.000082) was associated with the amount of matching mental health grants received per capita in fiscal year 1975-1976. The results from the regression for 29 counties indicate that none of the explanatory variables affected the amount of matching aid received. In contrast, the unemployment rate in the previous year (.271), the county population in the previous year (.000016) and the per capita expenditures for mental health programs in the previous year (.309) were positively related, and the number of privately practicing mental health professionals per 10,000 residents in the previous year (-1.16) was negatively related to the amount of matching aid received per capita by 16 western Oregon counties. In addition, the parameter estimates for the number of patients served by the county in the previous year (-.00075), the per capita county income (.000136), and the percentage of improved patients in the previous year (-.018) were significant at the 90 percent confidence level in this regression.
- The per capita mental health expenditures in the previous year (.485) were significantly correlated with the per capita amount of staffing aid received by 13 eastern Oregon counties in fiscal year 1975-1976.

Employment Effects: Professional Staff

- Research conducted by Ehrenberg (1973) and a research team for the ACIR (1977a) suggests that grants stimulate state and local govern-

ment spending for additional employees. In general, this study found that the per capita aid variables were positively correlated with the professional staff employed by counties per 10,000 county residents.

- The results from this study indicate that an additional dollar of non-matching aid per capita was associated with a .344 to .364 person increase in mental health professional staff per 10,000 residents for a sample of 26 Oregon counties in fiscal year 1975-1976. In the western Oregon county regression, the non-matching mental health aid variable was also positively correlated with the professional staff variable (.67).
- An additional dollar of matching aid appeared to stimulate the spending for additional professional staff in the 26 counties by .556 to .762 persons per 10,000 residents. The point estimate in the western Oregon regression indicates that matching aid had a strong effect on the number of professional staff employed by the western Oregon counties (1.254).
- This study found that a dollar of staffing grants per capita stimulated a .722 increase in the number of professional staff employed per 10,000 county residents.
- The average annual salary for mental health employees with specialized skills had no apparent effect on the number of staff employed for the sample of 26 Oregon counties. In contrast, the salary rate and the professional staff number were negatively correlated for the western Oregon counties (-.000024), suggesting a negatively sloping derived demand curve.

- It appears that unconditional aid was diverted into the hiring of new employees with specialized skills in western Oregon (.0227).

Employment Effects: Mental Health Staff Without Specialized Skills

- For the sample of 26 counties, the results imply that none of the mental health grants significantly affected the number of lesser-skilled staff employed.
- In western Oregon, the matching mental health aid was used, partly, to employ additional staff (1.389). The point estimate for the non-matching aid variable (.654) was significant at the 90 percent confidence level.
- The average salary rate for the lesser-skilled staff was not associated with the number of staff employed per 10,000 residents in any of the regressions.

Salary Effects; Professional Staff

- Previous research by Ehrenberg (1973) and the ACIR (1977a) implies that grants generally foster a minimal increase in the wages paid to state and local government employees. The ACIR found, also, that high matching and non-matching grants were related to lower public sector wage rates.
- The estimated regression coefficients for non-matching aid were not significantly different from zero in any of the regressions.
- The estimated regression coefficients for the staffing grants were statistically different from zero at the 90 percent confidence

level. The estimates suggest that staffing aid may have stimulated the salary level for existing employees or caused a change in the mix of professional staff employed.

- An additional dollar of matching aid per capita appeared to stimulate a \$2,173 increase in the average salary level for professional staff. The estimate of the wage effect of matching aid received by the western Oregon counties (\$2,861.25) was significantly different from zero at the 90 percent confidence level.
- The number of professional staff employed by Oregon counties appears to have had no effect on the average salary level. This provides tentative evidence that the wage rate is determined outside the budget process.

Salary Effects: Lesser-Skilled Staff

- Staffing and non-matching aid were not significantly correlated with the average salary for mental health staff without specialized skills in any of the regressions.
- The results indicate that a dollar of matching mental health aid per capita stimulated an \$890 to \$931 increase in the average salary levels for the lesser-skilled staff employed by 26 Oregon counties. The estimated regression coefficient for the matching aid variable in the western Oregon county regression was not significantly different from zero, however.
- The number of staff and the corresponding average annual salary were not correlated in any of the regressions.

Client-User Effects

- The results from this study indicate that staffing and non-matching grants were not significantly related to the number of mental health clients served by Oregon counties in fiscal year 1975-1976. Matching aid, in contrast, was positively associated with the number of clients cared for by the counties as a whole (237.627 to 364.71) and by the western Oregon counties (467.96).
- Population appears to have been a significant determinant of the number of resident-users. In addition, population density, the percentage of professional mental health staff, the per capita amount of grants received by private agencies and the number of mental health professionals in private practice per 10,000 county residents were significantly related to the number of patients treated in western Oregon programs.

Output Effects

- The estimated regression coefficient for the capital and material expenditures per capita (-.0011) was significantly correlated to the percentage of improved mental health patients treated in 29 Oregon county programs. The other hypothesized factors appear to have had no effect on the probability of successful treatment.

Did the Different Types of Mental Health Grants Have a Differential Effect on Oregon Counties' Budget and Production Decisions

- The Utility Maximization model of local fiscal decision-making predicts that open-ended conditional matching grants will stimulate

expenditures for the aided service by more than closed-ended conditional matching aid grants which, in turn, will be more stimulative than non-matching conditional grants. The Budget Maximization model, in comparison, predicts that these three types of grants will stimulate expenditures by, largely, the same amount. Past empirical studies generally have supported the Utility Maximization model's hypothesis. Moreover, the research team for the ACIR (1977a) found that different grants had different effects on employment and wage levels.

- Despite the diversity among estimates, the results from this study indicate that the three types of mental health grants did not have significantly different effects on mental health expenditures, mental health staff, and professional salaries. In only two instances were statistically different estimates found. In the combined county regression, staffing aid appeared to have a significantly greater effect on the average salary for mental health staff without specialized skills than did matching aid. Also, non-matching aid had a significantly greater effect on the number of persons treated by western Oregon clinics than did matching aid.

Comparison of Results for Eastern and Western Oregon

- A direct test for the equality of the coefficients for the separate data sets could not be done. The results indicate, however, that there was a difference in the expenditure response of eastern Oregon and western Oregon county officials to the mental health grants.

- The point estimates of the expenditure effects of matching and non-matching aid variables in the western Oregon regression were larger than the comparable estimates in the eastern Oregon regression. The estimated regression coefficients for Gmh and Gnmh in the western Oregon regression were 2.23 and 1.67. The comparable coefficient estimates in the eastern Oregon regression were .3 (not significantly different from zero) and .96.
- The results suggest that separate sets of factors determine the amount of aid received by eastern and western Oregon counties. In eastern Oregon, the county population, the unemployment rate, and the percentage of improved patients were significantly related to the amount of non-matching aid received in fiscal year 1975-1976. In comparison, none of the independent variables appear to have influenced the amount of non-matching aid received by western Oregon counties. Population was the only factor associated with the amount of matching aid received by eastern Oregon counties. For western Oregon, though, the unemployment rate, the county population, the expenditures for mental health services, the number of professionals in private practice, county income, the number of patients treated by the county clinics, and the percentage of successful treatment were all significantly correlated with the amount of matching aid received.

Suggestions for Future Research

The old saw that research raises more questions than it answers is never so apparent to a researcher than at the end of a study. It is at that time that the researcher is able to assess what he has come not to

know. Thus, corresponding to the findings discussed earlier in this chapter is a complementary set of findings about the needs for future searches and research.

The initial items on the suggested agenda for future research stem from the framework and data set used in this analysis. It is argued here that both the specific programs and types of patients associated with a county clinic should be more carefully examined and, perhaps, reclassified into finer categories. One possible course of study, if the data permit, might be to look at the effects of the grants earmarked for the programs and treatments for the mentally and emotionally disturbed, for the mentally retarded and developmentally disabled, and for the alcohol and drug dependent. Such a study would inevitably lead into a closer examination of the makeup of a department's staff and of the outputs of mental health services. The distinction made in this study between skilled and lesser-skilled staff was too gross a distinction and in need of further refinement. Because of this broad classification, nothing could be said about the effects of grants on the mix of staff. These substitutions among psychiatrists, psychologists, aides, and other mental health employees could have a significant effect on the programs and the likelihood of successful treatment.

Similarly, the output measure used in this study was an imperfect measure. Though the data appear to be limited now, increased attention should be given to developing a measure or set of measures that captures the flow of services provided by the individual county programs. In the development of this measure, the quantity and quality aspects of this flow should be considered. Moreover, with this measure the production and cost functions for county mental health services could be developed.

Summarizing what has been said before, these functions should describe the link between the direct inputs, the individual service elements, and final output and should contain variables representing the staff-patient environment and the external community environment.

In addition, the complete market for mental health services should be studied, including the private provision of mental health care. This research should attempt to identify the reasons why county residents would prefer to consume the products of private as opposed to public providers and to describe the short- and long-run effects of this competition on the county departments.

Finally, of the many possible further studies, two come immediately to mind. The first would be concerned with testing the separate models of local fiscal decision-making. For example, the assertion in this study that the mental health bureaus determine the production decisions would be a prime candidate for further study. Secondly, research could and should be focused on the normative aspects of the mental health grants. This research would be concerned with the objectives of the donor governments, the success of the different mental health grants in meeting these objectives and, lastly, the optimal design of the grants.

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Appendix I

Summary of Selected Models of Fiscal Behavior

One of the themes stressed in the literature review was that the reported effects of grants on local spending were sensitive to the analysts' particular vision of the local budgeting process. In other words, the behavioral relationships researchers included in their econometric models, as well as those they ignored, affected the parameter estimates on the grant terms. If grants are to be used to influence local fiscal choice, then a greater understanding of how local government allocate resources seems necessary.

A logical step towards greater understanding is to backtrack and examine, in some detail, the existing models of state and local government fiscal behavior. Accordingly, this appendix presents summaries of the theoretical models underlying eleven of the more important studies of local fiscal choice.

1. Davis and Haines, "A Political Approach to a Theory of Public Expenditure: The Case of Municipalities" (1966)

Davis and Haines' political theory of public expenditure is rooted in Buchanan's "individual theory of the state" and the idea that the individual voters in a democracy act in a collective capacity to make political decisions. Two groups of individuals are identified in this market for public services, local politicians and the voting residents.

The local officials, motivated by a desire to attain or remain in office, promise and choose a mix of expenditures and taxes that will appeal to a dominant coalition of voters. Like a game of chance, political contests are "won" by politicians who best approximate the expenditure-tax mix favored by a plurality of voters.

Politicians are constrained in their expenditure and taxation decisions by legal considerations; they cannot, for example, over-tax a minority of residents to lessen the burden for a specified majority of residents.

The politicians' counterparts in this fiscal dance are the resident voters who, motivated by self-interest, favor and vote for politicians that offer a package of expenditures and taxes close to their preferred package. Residents, at times, form coalitions to increase their share of benefits of expenditures while reducing their share of the taxes supporting these expenditure levels.

Davis and Haines, accordingly, identify two sets of factors relevant to their notion of the budget process. Firstly, taste-determining factors such as income (Y), population density (P), and the market value of residential and industrial property, (MR, MI) are expected to influence public expenditures. Secondly, a self-interest factor, the percent of the electorate owning property (E) is expected to influence public expenditures. Davis and Haines estimated the influence of these factors in a linear regression equation.

$$(1) \text{ Expdi} = A_0 + A_1Y + A_2P + A_3MR + A_4MI + A_5E$$

Where Expdi is the per capita expenditures by municipalities for service i.

2. Henderson, "Local Government Expenditures: A Social Welfare Analysis" (1968)

According to Henderson, local politicians, in response to their constituents, choose a budget package as if they were "maximizing a

social welfare function subject to a social budget constraint" (pg. 156).

According to Henderson, a community's collective welfare (W) can be expressed in the function:

$$(1) \quad W = (A + B_1Y + B_2R + B_3P)\text{Ln}G + X$$

where G and X denote per capita public and private expenditures, Y is the community's per capita personal income, R is the per capita revenue from state and federal governments, and P is population.

A revenue constraint limits community spending and the corresponding amount of well-being that can be attained. Taxes are assumed to be a fixed proportion (B) of the difference between local expenditures and intergovernmental revenues.

$$(2) \quad T = \beta(G - R)$$

Substituting the identity $T = Y - X$ into this equation yields the revenue constraint:

$$(3) \quad X + \beta G = Y + BR$$

Maximizing the welfare function subject to the community budget constraint results in a series of demand equations for public goods.

$$(4) \quad G = \frac{A_0}{B} + \frac{A_1Y}{B} + \frac{A_2R}{B} + \frac{A_3P}{B}$$

3. Booms and Hu, "Towards a Positive Theory of State and Local Expenditures: An Empirical Example" (1971)

Residents of a community are, at once, the demanders and suppliers of public funds for local schools. The officials they elect

to oversee a school district's operation represent perfectly "the desires of the typical person making up the governmental unit" when making tax and expenditure decisions for that district (p. 424). As in the market for private goods, then, the actual and desired level of financing for educational service depends upon the demand and supply forces within the community.

On the demand side, the per capita expenditures demanded for schools by the typical person in the community (Y_1) is considered a function of the tax rate (a price variable, Y_3), non-public school enrollment (X_1), per capita income (X_2), the percent of population of school age (X_3), the median education of the adult population (X_4), and the per capita expenditures for all other public services (Y_5). This relationship can be written as:

$$(1) Y_1 = A_0 + A_1Y_3 + A_2X_1 + A_3X_2 + A_4X_3 + A_5X_4 + A_6Y_5 + U_1$$

where U_1 is a term for random disturbances.

On the supply side, the per capita expenditures supplied for schools (Y_2) is considered a function of the tax rate, per capita income, per capita federal grants (Y_4), and the per capita interest expenditures for public schools (X_5). Mathematically,

$$(2) Y_2 = B_0 + B_1Y_3 + B_2X_2 + B_3Y_4 + B_4X_5 + U_2$$

Booms and Hu also developed estimating equations for the tax rate (Y_3), and for per capita federal aid (Y_4). The property tax rate is considered a function of per capita income, the per capita expenditures demanded for schools (Y_1), the per capita total assessed value of real property (Y_6), and the per capita interest expenditures.

Similarly, the level of federal aid per capita is considered a function of per capita income, the percent of the population of school age, and the per capita expenditures demanded for schools. The functions can be written as:

$$(3) \quad Y_3 = C_0 + C_1X_2 + C_2Y_1 + C_3X_6 + C_4X_5 + U_3$$

$$(4) \quad Y_4 = D_0 + D_1X_2 + D_2Y_1 + D_3X_3 + U_4$$

Finally, Booms and Hu specified a market clearing equation.

$$(5) \quad Y_1 = Y_2$$

4. Inman, "Towards an Econometric Model of Local Budgeting" (1971)

Inman characterizes the local government decision-making process as "the optimization of a 'leadership preference function' subject to a budget constraint" (p. 701). Inman neither identifies the 'leader' nor specifies the political, sociological or psychological basis for the preference functions. Four elements comprise the preference function.

A. Locally provided facilities consumed in the current budget period

Local facilities (X_i) are produced by the transformation of labor (L), capital (K) and material (M) inputs -- $(1)(X_i) = X_i(K,L,M)$. Assuming that the production function for X_i is homothetic, a cost index $C(i)$ corresponding to X_i can be constructed, such that the $C(i)$ multiplied by X_i equals the total current expenditure on service i (E_i).

$$(2) \quad E_i = C_i X_i \quad \text{or}$$

$$(3) \quad \frac{E_i}{C_i} = X_i$$

B. Gross Additions to the Public Capital Stock

Inman argued that local officials gain satisfaction not only from the stream of public services flowing from the additions to the capital stock but, also, from their "political marketability", a type of consumption ("Mayor Daley Phenomenon") (p. 703). Accordingly, total investment is equal to a cost index multiplied by the increase in the capital stock (I).

$$(4) \quad E_K = C_i K$$

C. Current Private Community Income

Local leaders consider the relative burden of tax instruments in their budget deliberations, according to Inman. A dollar of any given tax may not reduce community income by a full dollar. Corporate taxes, for example, may be shifted to persons outside the community. The true "burden price" of taxes, τ_t is thus defined by:

$$(5) \quad \tau_t = (1 - P_t^f Q^f - P_t^s Q^s - \gamma_t - \theta_t)$$

where P_t^f and P_t^s are the portion of tax t that can be deducted from federal and state taxes, Q^f and Q^s are the community's weighted (by income distribution) federal and state income tax rates, γ_t is the percent of tax t credited towards payment of state or federal income taxes, and θ is the portion of taxes

avoided by residents due to non-resident taxation. The total burden of taxes can be expressed as;

$$(6) \quad \tau_t \cdot T_t = B_t$$

where T_t equals total revenues from tax instrument t .

The index for present community income, including the profits of firms can, therefore, be expressed as:

$$(7) \quad Y_p = Y_p (\beta_1^T \dots \beta_m^T / Y_T)$$

where Y_T equals total current community income less federal and state tax payments.

D. Stream of Future Private Incomes

Similarly, the leadership preference function contains future private income adjustment for the debt burden price as an argument. The burden of debt instrument K on future income is defined by:

$$(8) \quad \beta_K^D = D_K \cdot (1 + r_K) T_i$$

where D_K equals current period borrowing on debt instrument K , r_K is the interest premium for K and T_{it} is the weighted average, by tax shares, of the anticipated burden price of tax instrument t in the succeeding periods. The debt burden price is:

$$(9) \quad (1 + r_K) \cdot T_{it}$$

The index of future private income can be expressed as:

$$(10) \quad Y_{Pt} = Y_{Pt} (\beta_1^D \dots \beta_m^D / Y_{TF})$$

where T_{TF} equals total community income in future periods less federal and state taxes.

E. Specific Functional Form and Budget Constraint

Inman assumed that the leadership preference function has a specific mathematical form:

$$(11) P(\cdot) = (K - \alpha_1)^{\beta_1} (Y_p - \alpha_2)^{\beta_2} (Y_p - \alpha_3)^{\beta_3} \prod (X_i - \alpha_i)^{\beta_i}$$

where the X_i 's are the individual public services and the α 's are the minimum subsistence parameters.

Inman's view of the fiscal choice process can be described by the maximization of the utility function subject to the following budget constraint:

$$(12) \quad \sum C_i X_i + C_i K = \sum T_t + \sum D_K + M_i(C_i X_i) + M_i(C_i K) + \sum e_t T_t + \sum e_K D_K + Z$$

where the M_i 's are the matching rates for matching grants with open-ended finance, Z includes all closed-ended matching grants, conditional grants, and unconditional grants, and the e 's are effort indices for unrestricted aid disbursed on the basis of tax effort.

The first order conditions can be solved for X , T , D , and K as functions of prices (C 's, M 's, and e 's) and exogenous aid, Z .

5. Borcharding and Deacon, "The Demand for the Services of Non-Federal Governments" (1972).

The mix and level of spending in a jurisdiction is the end result of a series of collective decisions. Borcharding and Deacon assume that government officials are elected through a system of majority rule. All residents vote in these elections and know perfectly their preferred mix of services and taxation as well as the mix promised by the political constituents. Because there are few barriers to entry, political activity is brisk. The competition between politicians consequently results in the election of those individuals who promise a budget package identical to the preferred package of the median voter. Borcharding and Deacon further assume that the output is produced at least cost.

Public services are produced with capital and labor inputs according to a Cobb-Douglas production function:

$$(1) \quad X = aL^{\beta}K^{1-\beta}$$

Assuming that the rental rate for capital is constant over all government units, Borcharding and Deacon derive the following expression for the marginal cost of a given public service.

$$(2) \quad C_x = aW^{\beta}$$

where W is the wage rate for the labor inputs.

The amount of X captured by the median voter depends on the divisibility of the service flow (the degree of 'publicness' of the good).

$$(3) \quad Q_x = X/N^{\alpha}$$

where N is the number of persons in the community. If α equals zero,

then X is a pure public good. Conversely, if α equals one, then X is a pure private good.

Since it is assumed that the median voter pays an equal share of taxes to finance each unit of output, the "marginal tax price" facing the median voter can be defined:

$$(4) \quad S = (C_x/N)(X/N^\alpha) = C_x/N^{\alpha-1}$$

Borcherding and Deacon posit the median voter's demand schedule for Q as:

$$(5) \quad Q = \theta a S^\gamma Y^\delta$$

Substituting equations 2, 3, and 4 into this demand schedule results in an equation for the per capita expenditure for service X ($E = SQ$).

$$(6) \quad E = A' W^\beta (\gamma + 1) Y^\delta N^{(\alpha - 1)(\gamma + 1)}$$

In logarithmic form:

$$(7) \quad \ln E = \ln A' + (\gamma + 1) \ln W^\beta + (\alpha - 1)(\gamma + 1) \ln N + \delta \ln Y$$

This final term is expanded to include other soci-economic variables.

6. Bergstrom and Goodman, "Private Demands for Public Goods" (1973)

With the same assumptions as those used by Borcherding and Deacon, Bergstrom and Goodman argue that a political jurisdiction supplies, at constant cost, the quantity of a municipal commodity demanded by the median voter at the price $T_i Q$, his take share (T_i) multiplied by per unit cost (Q_i).

The flow of services from the commodity to the median voter is given by the function:

$$(1) \quad Z^* = N^{-\gamma} Z$$

where N is the number of persons sharing the good and Z is the amount of public good. Again, if $\gamma = 0$, the good is a pure public good and if $\gamma = 1$, the good is a pure private good.

The median voter's demand schedule is determined from the optimization of this utility function subject to a budget constraint. The utility function can be described by:

$$(2) \quad U = U(X_i, Z^*)$$

where X_i represents private goods. The budget constraint is defined as;

$$(3) \quad X_i + T_i Q N^\gamma Z^* \leq Y_i$$

where Y_i is the median voter's income.

Assuming constant price and income elasticities for Z^* , the following demand function for Z^* can be constructed:

$$(4) \quad Z^* = C [T_i Q N^\gamma]^\delta Y_i^\epsilon$$

where δ and ϵ are the price and income elasticities for Z^* , respectively. The quantity of Z demanded in N^γ times the quantity of Z^* demand. The demand for Z , then, is:

$$(5) \quad N^\gamma C T_i Q N^\gamma \delta Y_i^\epsilon = C Q^\delta T_i^\delta Y N^{\gamma(1 + \delta)}$$

This expands in logarithmic form to:

$$(6) \quad \text{Log } E = C + \alpha \text{Log}N + \delta \text{Log}T_i + \epsilon \text{Log}Y + \sum \beta_i X_i$$

where $\alpha = \gamma(1 + \delta)$, E represents cost deflated expenditures as a proxy for Z^* , and the X_i 's are need variables.

7. Gramlich and Galper, "State and Local Fiscal Behavior and Federal Grant Policy" (1973)

Local officials determine the levels of expenditures, revenues, and budget surplus in a manner similar to that attributed to households. The objectives they seek from budgetary policy are the arguments of the decision-maker's utility function; the limits to the attainment of these objectives are described by a budget constraint. Maximizing the utility function subject to a budget constraint leads to a series of estimating equations that should explain the observed levels of expenditures, revenues, and the budget surplus.

Gramlich and Galper assert that budget decision-makers have four main objectives.

A. Higher Current Expenditures

Officials gain utility from expenditures mandated by federal grants (E_m) and from locally initiated discretionary expenditures (E). Taken together, mandated and discretionary expenditures define the identity:

$$(1) \quad \text{Exp} = E + E_m$$

where Exp equals total expenditures. Gramlich and Galper for-

mally define the utility obtained from the two types of expenditures as:

$$(2) \quad Q_1 = E/PE + \gamma_1 Em/PE - N$$

where PE is an expenditure price deflator, N reflects minimum expenditure needs, and γ_1 is a "grant displacement parameter" that allows for a differential utility gain from mandated as opposed to discretionary expenditures.

B. Higher Private Disposable Incomes

An official's level of satisfaction is positively related to pretax income (Y) and negatively related to taxes (T). However, it is unlikely they receive the same satisfaction from equivalent changes in taxes and incomes, since they would prefer that disposable incomes rise through a cut in taxes, an action they could take credit for, rather than through a rise in pretax earnings.

The utility associated with the disposable income objective can be expressed as:

$$(3) \quad Q = \gamma_2 Y/P - T/P$$

where P is a price deflator and γ_2 reflects the differential utility gain from an increase in income as opposed to a fall in taxes.

C. Stock of Tangible Capital

Gramlich and Galper assume the flow of services from capital goods is proportional to the stock of capital. Dis-

tinguishing, again, between mandated and discretionary expenditure, they formulate the capital term in the utility function as:

$$(4) \quad Q_3 = (1 - \delta)(KO_{-1} + \gamma_3 KM_{-1} + I/P_I + \gamma_3 Im/P_i)$$

where δ is the depreciation rate, KO_{-1} and Km_{-1} are lagged stock variables for discretionary and mandated capital, I and Im are discretionary and mandated investment variables, and γ_3 represents the differential utility of mandated versus discretionary expenditures.

D. Stock of Net Financial Assets

Officials desire to increase the flow of services from the stocks of financial assets. The utility gained from this flow can be expressed as:

$$(5) \quad Q_Y = FA_{-1} / P + S/P$$

where FA_{-1} is the stock of assets in the previous period and S is current net financial services.

Specific Functional Form and the Budget Constraint

Gramlich and Galper posit that the utility function takes on a special form:

$$(6) \quad U = \sum A_i Q_i - \frac{A_i^2}{2} Q_i^2 \quad i = 1, 2, 3, 4$$

Estimating equations for the four arguments of the utility function are derived from the maximization of this utility function subject to the budget constraint:

$$(7) \quad I(1 + R + \delta) + E(1 - Ma) + S - T = B + Ci - Im + C - Em - D$$

where $I(R + \delta)$ is the interest and debt retirement payment on current debt, D is the interest and debt retirement payment on previously incurred debt, Ma is the matching rate for grants, and B represents lump sum grants.

8. Feldstein, "Wealth Neutrality and Local Choice in Public Education" (1975)

Feldstein, in this article, considers the "problem of financing local public education in a way that partially or completely neutralizes the effects of local wealth differences without sacrificing the opportunity for local choice" (p. 76). As a first step in the analysis, Feldstein has the wealth elasticity of school spending serve as a measure of the degree of wealth neutrality:

$$(1) \quad \text{Ln}E_i = \alpha_0 + \alpha_1 \text{Ln}W_i + M_i$$

where E_i equals expenditure per pupil in community i , W_i represents wealth (fair market value of property per pupil), and α_1 measures wealth neutrality. Complete wealth neutrality requires $\alpha_1 = 0$.

Within a more complete expenditure equation, the wealth neutrality parameter is defined not only by the coefficient on the wealth variable but also the other behavioral parameters in the equation. A general expenditure equation can be expressed as:

$$(2) \quad \text{Ln}E_i = \beta_0 + \beta_1 \text{Ln}W_i + \beta_2 \text{Ln}P_i + \sum_{j=3}^K \beta_j \text{Ln}X_{ji} + \epsilon_i$$

where P , a price variable, equals one minus the matching rate of

educational grants, and the X_j 's represent various need variables. Accordingly, the wealth neutrality coefficient is not expressed by:

$$(3) \quad \alpha_1 = \beta_1 + \beta_2 \gamma_{pw} + \sum_{j=3}^K \beta_j \gamma_{X_j, W}$$

where γ_{pw} is the constant elasticity of P with respect to W and $\gamma_{X_j, W}$ is the elasticity of X_j with respect to W .

Combining the partial wealth elasticity (β_1) with the other terms not related to price into a single wealth elasticity term ($\beta_w = \beta_1 + \sum \beta_j \gamma_{X_j, W}$) and relabeling the price elasticity ($\beta_p = \beta_2$) equation 3 becomes:

$$(4) \quad \alpha_1 = \beta_w + \beta_p \gamma_{pw}$$

Since β_w and β_p are behavioral parameters of the system, this equation implies that donor governments can tie the matching conditions for grant to the elasticity of P with respect to w and achieve any desired level of wealth neutrality. Complete wealth neutrality can be obtained by setting.

$$(5) \quad \gamma_{pw} = -\beta_w / \beta_p$$

Feldstein obtains values for β_p directly from a median voter demand function in which expenditures per pupil are considered a function of price (P), wealth (W), median per capital income (Y), block grants (SG , FG), residential portion of property tax base (R), number of pupils (PUP), and number of pupils enrolled in private schools ($Priv$).

$$(6) \quad \ln E = \alpha_0 + \alpha_1 \ln P + \alpha_2 \ln W + \alpha_3 \ln Y + \alpha_4 \ln SG + \alpha_5 \ln FG + \\ \alpha_6 R + \alpha_7 PUP + \alpha_8 Priv. + U$$

He estimates a value for β_w by regression W on $\text{Ln}E = \beta_p \text{Ln}P$:

$$(7) \quad \text{Ln}E = \beta_p \text{Ln}P = \beta_0 + \beta_1 W$$

where the value of β_1 is an estimate of β_w . From this, then, he calculates the necessary value of γ_{pw} for complete wealth neutrality.

9. Ladd, "Local Education Expenditures, Fiscal Capacity, and the Composition of the Property Tax Base"

Ladd argues "that the composition of the property tax base affects local decisions to provide educational services" (p. 145). She examines this hypothesis within the context "of an individualistic utility maximization model adapted to the process of collective choice by a majority rule, median voter assumption" (p. 146). Hence, the observed demand of the community is, in fact, the quantity demanded by the median voter in the community.

The influence of tax base composition on a community's demand for education services can be isolated by manipulating the budget constraint facing the median voter. The budget constraint is given as:

$$(1) \quad Y_m = P_x X_m + (t + d) H_m$$

where Y_m is the income of the median voter, P_x is the price for non-housing private goods and services (X_m), t is the community tax rates, d is the fraction of the value of the housing stock expended yearly, and H_m is the value of the housing stock of the median voter.

If the resource cost of education services (E) is PE , the community tax rate is:

$$(2) \quad t = \frac{PE \cdot E \cdot N}{N \cdot Ha + NR}$$

where N is the number of voters in the community, Ha is the average value of housing stock in the community and NR is the value of non-residential property.

The tax price the median voter must pay for educational services is:

$$(3) \quad \frac{PE \cdot N \cdot Hm}{N \cdot Ha + NR}$$

or

$$(4) \quad PE \cdot RB \cdot Hm/Ha$$

where RB equals $N \cdot Ha / (N \cdot Ha + NR)$.

Thus, the price of education consists of the three components, PE , RB , and Hm/Ha . If residents believe that a portion of the tax on commercial and industrial firms is passed on to them, then RB can be transformed to RB^* where:

$$(5) \quad RB^* = a - \alpha C - \beta I$$

where C and I are the commercial and industrial fraction of tax revenues and α and β represent the fraction of the tax not shifted onto residents.

Ladd estimates a similar equation to that used by Feldstein to determine the impact of tax base composition.

$$(6) \quad LNE = \alpha_0 + \alpha_1 \text{LnLS} + \alpha_2 \text{LnSG} + \alpha_3 \text{LnFG} + \alpha_4 \text{LnPUP} + \alpha_5 \text{LnPriv} \\ + \alpha_6 \text{Pov} + \alpha_7 \text{Prof} + \alpha_8 \text{RB} + \alpha_9 Y + \alpha_{10} \text{LnWP}$$

where Y is median income, WR equals the market value of residential property per pupil, LS , the local tax price, is equal to $1/1 + M$ (M is the matching rate, SG and FG are bloc grants, PUP is public school pupils as a fraction of the total population, $Priv$ is the fraction of students who attend private schools. Pov is the fraction of families with incomes below poverty level, and $Prof$ is professional, technical and kindred workers as a fraction of the total population.

10. McGuire, "A Method for Estimating the Effect of a Subsidy on the Receives Resource Constraint With an Application to U.S. Local Governments" (1975)

Local officials allocate resources and generate revenues in a manner analogous to a process of constrained preference maximization. These officials can divert grant money earmarked for particular services into other public goods and tax relief. Hence, the effective post-grant budget line is not known by the analyst and must be estimated. Only in this way can the price and income effects of grants be determined.

Assuming a constant proportion (ϕ) of a conditional grant is not diverted to other goods, the effective price for the aided good is:

$$(2) \quad P = 1 + (\phi + 1) MA$$

when La represents local spending on aided good A , G represents the total amount of the grant disbursed, and Ma represents the administrative matching rate for the grant.

This P term enters into the community's budget constraint.

$$(3) \quad R = Y + PaQa + PnQn = Y + \phi a Fa + \phi n Gn$$

where Y is income, Qa is the amount of good A, Qn is the amount of good N, and R is total community resources.

McGuire assumes that local community officials maximize:

$$(4) \quad U = (Y - Y\gamma)^{\beta_Y} (Qa - \gamma a)^{\beta_a} (Qn - \gamma n)^{\beta_N}$$

subject to the budget constraint, yielding the expenditure equations:

$$(5) \quad PaQa = La + \phi a Ga = -\beta a \gamma_Y + \beta a R + (1 - \beta a) \gamma a Pa - \beta a P_N$$

$$(6) \quad P_N Q_N = L_N + \phi_N G_N = -\beta_N R + \beta_N R + (1 - \beta_N) \gamma_N P_N - \beta_N \gamma a Pa$$

Substituting for R, expanding the Pa and P_N terms and including a Π parameter to account for the differential effect of a dollar increase in grants versus a dollar increase in private disposable income, McGuire solves for La and L_N:

$$(7) \quad La = \beta a Y + \beta a \Pi \phi_N G_N + (\beta a \Pi - 1) \phi a Ga + (1 - \beta a) [1 + (\phi a - 1) Ma] \cdot \gamma a + \beta a [1 + (\phi_N - 1) M_N] \gamma_N - \beta a \gamma_Y$$

$$(8) \quad L_N = \beta_N Y + (\beta_N \Pi - 1) \phi_N G_N + \beta_N \phi \Pi a Ga - \beta_N [1 + (\phi a - 1) Ma] \cdot \gamma a + (1 - \beta_N) [1 + (\phi_N - 1) M_N] \gamma_N - \beta_N \gamma_N$$

For the actual estimation, ϕ can be fixed or determined using two-stage least squares.

11. Advisory Commission on Intergovernment Relations, "Federal Grants: Their Effects on State-Local Expenditures, Employment Levels and Wage Rates" (1977)

An unspecified decision-maker for a local government has two interrelated roles in the budget process. First, he must decide how much he should tax local residents to supply an optimal quantity of public services. Then he must buy the optimum combination of laborers, material, and capital inputs to produce the public services. These decisions are determined from the as-if maximization of his utility function subject to both a budget constraint and a technological constraint.

Public goods and private goods comprise the arguments of the decision-maker's utility function:

$$(1) \quad U = U(N_i, X_i)$$

where N_i represents public good i and X_i represents private good i .

N is produced by labor (S) and other variable inputs (M) according to a fixed factor production function.

$$(2) \quad N = \text{MIN} [S, (S/M)M]$$

With the fixed proportion assumption, the number of employers serves as an ordinal measure of output. The total cost (e) of obtaining any amount of public services depends on the prices of the inputs (W, r) and the amount of laborers and other inputs used.

$$(3) \quad e = WS + rM$$

substituting equation 2 into equation 3.

$$(4) \quad e = (W + ur)S \quad \text{where } U = S/M.$$

Hence, the number of laborers times the cost index, $W + ur$, equals the total cost of providing public services.

The authors of the ACIR report skip from this justification for laborers as a proxy for output to two sets of functional relationships. In the first they assume:

$$(5) \quad S = \alpha_0 + \alpha_1 C^* + \alpha_2 \text{PopD} + \alpha_3 \text{SK} = \alpha_4 Y + \sum \alpha_i G_i$$

where S is the number of full-time state and local employers, C^* equals the average wage rate plus other input costs per staff member, PopD is population density, SK is the median education of the adult population over 25 years of age, Y is per capita income, and G_i 's represent the different types of grants received by state and local governments.

A wage equation is also included in the study to estimate the effect of grants on public employee's wages.

$$(6) \quad W = \alpha_0 + \alpha_1 \text{OW} + \alpha_2 U + \alpha_3 \text{PopD} + \alpha_4 \text{Urb} + \alpha_5 \text{SK} + \sum \alpha_i G_i$$

where W is the average wage rate, OW is the average wage received by manufacturing workers in the community, U reflects the degree of unionization among public sector employees, and Urb is the percent urbanization in the state.

Appendix II
Sources of Information

The purpose of this appendix is two-fold. It provides the reader with a listing of the sources of information for the economic variables used in the econometric analysis of chapter five. It also seeks to guide the reader through the frustrating, though fruitful, manner in which primary data were collected for the principle grant terms; (1) unconditional aid, (2) conditional aid for non-mental health services, and (3) the staffing, matching, and non-matching mental health aid.

Sources of Information

1. Data for the following variables were obtained from the Oregon County Audits (Oregon Secretary of State, Division of Audits) for the fiscal years 1974-1975 and 1975-1976. These data were supplemented, whenever necessary, with statistics gathered from the Oregon County Budgets for 1977-1978 (Oregon Department of Revenue, Local Budget Section). Budget officers for local governments in Oregon are required by law to include in the budget document the actual dollar amounts spent by the local government for services in the second and third previous fiscal years.

Expenditures are for current, non-capital outlays. This excludes tax pass-throughs, major capital construction, debt-financed expenditures, and expenditures for public service enterprises. The expenditure and grant variables were calculated on a per capita basis; the labor variables were calculated per 10,000 county inhabitants.

Total Current Expenditures for Mental Health programs (Emh)

Total Current Expenditures for Other County programs (Enmh)

Ending Fund Balances (EFB)

Beginning Cash Balances (CB)

Materials and Supplies Costs for Mental Health Departments (EOC)

Full-time Equivalent Mental Health Staff with Specialized Training (Lp)

Average Annual Salary for Mental Health Staff with Specialized Training (Wp)

Full-time Equivalent Mental Health Staff Without Specialized Training (Lnp)

Average Annual Salary for Mental Health Staff Without Specialized Training (Wnp)

Percent Mental Health Staff with Specialized Training (PS)

Unconditional Grants (Gu)

Conditional Grants for Non-Mental Health Services (Gn)

2. Data for the following variables were obtained from Oregon Economic Statistics 1977 (Bureau of Business Research, University of Oregon). Population estimates for the fiscal year 1975-1976 were collected from Population Estimates of Counties and Incorporated Cities of Oregon, 1 July, 1975, a report published by the Oregon Center for Population Census and Research (Portland State University). The income variable was calculated on a per capita basis.

County Population (POP)

Population Density (POPD)

Average Annual County Income (INC)

3. Information for a number of variables was culled from published and unpublished documents compiled by employees of the Oregon State Mental Health Division. Statistics for the number of patients served by county mental health programs (N) and the percentage of patients considered "improved" upon release (TR) were collected from the annual reports of the community alcohol programs and the community mental health

clinic programs. Information about the number of psychiatrists, psychologists, social workers, and counselors in private practice was taken from the grant requests submitted by the directors of the county mental health programs to the division. Estimates of the amount of grants-in-aid received by sub-contract agencies (SUB) were gathered from computer printouts provided by the division.

4. County unemployment rates (UNE) and the opportunity wage in the service sector (OWS) were obtained from the published reports of the Oregon Employment Division.

The residential fraction of the property tax base (RES) and the combined average tax rate of competing local governments (OVERB) were calculated from property tax statistics published by the Oregon Department of Revenue.

Unconditional and Conditional Grant Variables

In the preliminary stages of this research, it was intended to classify the grants received by counties for services and programs other than mental health programs as exactly as possible. Some of the proposed grant categories included (1) conditional, non-matching; (2) open-ended, conditional, matching; (3) closed-ended, conditional, matching; (4) formula grants; (5) project grants; (6) unconditional grants; and (7) shared taxes. These categories were quickly discarded for the broader distinctions of conditional and unconditional grants for two reasons. Firstly, these types of grants were of secondary importance to the aims of the research. Secondly, the more heavily populated counties received numerous federal and state grants, in some cases more than 50 identifiable grants and shared revenues. It would have been

too costly to determine the particular conditions placed on each federal and state subsidy.

For purposes of the research, grants, shared taxes, and other subsidies were classified as either conditional or unconditional based on Table 21. The shared tax revenues and the in-lieu-of subsidies, while not pure forms of grants, are like grants in that money is transferred from one unit of government to another unit of government. Hence, these two types of subsidies were included in the figures and classified according to the conditions placed on their uses by the donor governments.

Mental Health Grant Variables

Collecting precise figures for the three mental health grant variables proved to be a troublesome task. Five separate sources of data for the grants were examined and re-examined. At the end of this circular trip, not one of the sources stood out as demonstrably superior to another.

Data were originally gathered from the audits. For certain counties, though, the mental health grants were aggregated into a single dollar figure making it impossible to distinguish between the matching and non-matching grants. The 1977-1978 budgets for the counties were then examined. In all cases, the counties that had aggregated grant data in their audits had aggregated figures in their budgets. More frustrating still, the budget figures and the audit figures often did not jibe, though, supposedly, the figures in the 1977-1978 budgets were based on the previous years' audits.

Accountants and cost analysts at the State Mental Health Division were then consulted. They were able to provide two sets of information.

Table 15 . State and Federal Aid to Oregon Counties for 1974-1975 and 1975-1976: A Partial Listing

Revenue Label	Unconditional Subsidy	Conditional Subsidy
<u>Federal</u>		
1. Oregon and California Act	X	-
2. General Revenue Sharing	X	-
3. United States Forest Service	-	X
4. Public Domain Revenues	X	-
5. Taylor Grazing	-	X
6. Flood Control Act	-	X
7. Public Land Sales	-	X
<u>State</u>		
8. Highway Revenues	-	X
9. Liquor Revenue	X	-
10. Cigarette Tax Revenues	X	-
11. Amusement Service Tax	X	-
12. Gasoline Taxes on County Cars	-	X
13. County Fair Subsidies	-	X
14. Co-op Taxes	X	-
15. Rural Telephone Tax	X	-
16. Private Car Company Tax	-	X
17. Wildlife Commission Payments	X	-

Table 15 . (continued)

Revenue Label	Unconditional Subsidy	Conditional Subsidy
18. Marine Board Grants	-	X
19. Election Cost Reimbursement	-	X
20. Autopsy Reimbursements	-	X
21. Vocational Rehabilitation Grants	-	X
22. Abundant Food/Food Stamp Grants	-	X
25. Veterans Affairs	-	X
24. Solid Waste & Water Quality Planning	-	X
25. Juvenile Court Subsidy	-	X
26. Youth Care Centers	-	X
27. Deputy District Attorney	-	X
28. Police Training	-	X
29. Museum	-	X
30. Willamette Greenway	-	X
31. Airport	-	X
32. State Forest	-	X

Sources: Bureau of Governmental Research, State Payments to Counties and Cities in Oregon, 1973-1974.

The summary, compiled for the Association of Oregon Counties, only distinguished between state and federal aid. Moreover, it included transfers to sub-contract agencies. Accordingly, it was not consistent with either the audit or budget information. The second source of information available from the division was the computer printouts of payments from the division to the counties for the two fiscal years. Due to a computer malfunction, the 1974-1975 information was incomplete. The 1975-1976 payments by grant type were summarized. Again, these figures were out of line with the audit and budget figures. Division officials could offer no explanation for this discrepancy.

As a last resort, a survey was sent to the directors of the county mental health programs (see Appendix III).^{1/} After an initial low response, a follow-up survey was sent. This was then followed by a telephone call, and, in one instance, a person-to-person interview with a county mental health director.^{2/} In all, 24 Oregon county programs responded to the questionnaire. The directors of the remaining mental health programs either did not have the information or refused to answer the questionnaire. The responses, in general, proved frustrating as they differed from the other reported information.

It was then decided to reply on the original audit data since this was the source of information for other key variables. For those counties with aggregated figures, the audit data were supplemented with the State Division data and the survey data.

^{1/} A pre-survey was sent to the Benton County Mental Health Clinic.

^{2/} Grant County Director George Fisher.

Appendix III

Survey Questionnaire

Questionnaire _____

County Mental Health Program Survey

1. County administered mental health programs are funded by a variety of sources. Several state and federal grant programs, for example, require a local match. These include Community Residential Services Grants, Halfway House Grants, and Federal Staffing Grants. Did your county receive any of these types of grants between 1974 and 1976?
- _____ Yes (Go on to Q. 2) _____ No (Skip to Q. 4)
-
2. How much state grant money, if any, requiring a local match did your county receive in the fiscal year 1974-1975?
- \$ _____ dollars _____ Received no money
-
- 2a. And how much, if any, state grant money requiring a local match did your county receive in the fiscal year 1975-1976?
- \$ _____ dollars _____ Received no money
-
3. How much federal grant money, if any, requiring a local match did your county receive in the fiscal year 1974-1975?
- \$ _____ dollars _____ Received no money
-
- 3a. And how much federal grant money, if any, requiring a local match did your county receive in the fiscal year 1975-1976?
- \$ _____ dollars _____ Received no money
-
4. On the other hand, your county may also receive state and federal grant money not requiring a local match. These include Alternative Hospitalization grants, Alternative Day Treatment grants and Alcoholism Service grants. Did your county receive any of these types of grants between 1974 and 1976?
- _____ Yes (Go on to Q. 5) _____ No (Skip to Q. 7)
-
5. How much state grant money, if any, not requiring a local match did your county receive in the fiscal year 1974-1975?
- \$ _____ dollars _____ Received no money
-
- 5a. And how much state grant money, if any, did your county receive in the fiscal year 1975-1976?
- \$ _____ dollars _____ Received no money
-
6. How much federal grant money, if any, did your county receive in the fiscal year 1974-1975?
- \$ _____ dollars _____ Received no money
-
- 6a. And how much federal grant money, if any, did your county receive in the fiscal year 1975-1976?
- \$ _____ dollars _____ Received no money

7. County administered mental health programs may also receive money from private contributions, schools, and other local governments, excluding state and federal sources. Did your county receive money from these outside sources between 1974 and 1976?

_____ Yes (Go on to Q. 8) _____ No (Skip to Q. 9)

8. How much money, if any, did your mental health program receive from these outside sources in the fiscal year 1974-1975?

\$ _____ dollars _____ Received no money

- 8a. And how much money, if any, did your mental health program receive from these outside sources in the fiscal year 1975-1976?

\$ _____ dollars _____ Received no money

9. County mental health programs are also supported by internal county money. These sources include fees, general fund contributions, and revenue sharing transfer. How much internal county money, if any, supported your county administered program in the fiscal year 1974-1975?

\$ _____ dollars _____ Received no money

- 9a. How much internal county money, if any, supported your county administered program in the fiscal year 1975-1976?

\$ _____ dollars _____ Received no money

10. Counties may also provide money for mental health programs not administered by the counties but located within the county. These might include halfway houses, and alcohol rehabilitation centers. Did your county provide money to programs not administered by the county between 1974 and 1976?

_____ Yes (Go on to Q. 11) _____ No (Skip Q. 11)

11. How much money, if any, did your county provide to other mental health programs in the fiscal year 1974-1975?

\$ _____ dollars _____ Received no money

- 11a. And how much money, if any, did your county provide to other mental health programs in the fiscal year 1975-1976?

\$ _____ dollars _____ Received no money

_____ YES, I would like to receive a summary of results (see below)

_____ NO, I would not like to receive

NAME _____ ADDRESS _____

Thank you for your cooperation

Appendix IV

Selected Regression Results

Table 16. Estimated Parameters for Non-Mental Health Expenditure Equations:
 Dependent Variable is Per Capita Expenditures for Non-Mental Health Services (ENMI), 1975-1976

Equation	GS	GMI	GMMI	GU	GN	INC	RES	C8	CONSTANT	Adj. R ²	F	O-W	Sample; Estimation Procedure
15.1	-1.538 (3.596)	23.366 (14.846)	-1.359 (8.956)	1.198** (.544)	1.361*** (.355)	.0127** (.0058)	-101.022 (86.048)	.0265 (.182)	-5.571 (55.522)	.72	10.61***	1.60	31 Oregon Counties; O.L.S.
15.2	- -	14.914 (10.795)	-.0695 (11.22)	.987*** (.274)	1.267*** (.222)	.0035 (.0050)	-7.036 (60.244)	.471** (.182)	-3.2 (33.352)	.95	46.1***	2.86	18 W. Oregon Counties; O.L.S.
15.3	-16.002 (25.714)	-3.309 (46.802)	-31.332 (21.580)	-2.891 (5.547)	1.662 (1.283)	.0253* (.0146)	-128.272 (521.801)	-.311 (.525)	170.548 (230.332)	.32	1.71	2.56	13 E. Oregon Counties; O.L.S.

STANDARD ERRORS in parentheses.

* = Significant at 90 percent confidence level.

** = Significant at 95 percent confidence level.

*** = Significant at 99 percent confidence level.

One-tailed test run for GU, GN, INC, RES; two-tailed tests for remaining variables.

O.L.S. = Ordinary Least Squares.

O-W = Durbin-Watson Statistic.

Table 17. Non-Matching Mental Health Grant Equations: Dependent Variable is Amount of Non-Matching Grants Received Per Person by Oregon County Mental Health Programs (Gmhb), 1975-1976

Equation	MNE	N_{t-1}	INC_{t-1}	UNE	POP_{t-1}	PSY_{t-1}	SUB_{t-1}	TR_{t-1}	CONSTANT	Adj. R_2	F	O-W	Sample; estimation procedure
16.1	-.0206 (.0835)	.00025 (.00055)	.000003 (.00055)	-.394*** (.1347)	-.0000094 (.0000116)	.812 (.765)	.065 (.111)	-.029** (.0127)	4.936 (1.642)	.27	2.50*	1.24	18 Oregon Counties; O.L.S.
16.2	.137 (.202)	-.000052 (.0008)	-.00014 (.00015)	-.182 (.168)	.00000045 (.000016)	.602 (.904)	.047 (.146)	-.0034 (.02)	2.66 (2.14)	-.27	.604	2.15	18 Oregon Counties; O.L.S.
16.3	.091 (.079)	-.000065 (.00053)	.000061 (.0000937)	-.42** (.147)	.000087** (.000031)	-2.64 (1.265)	-.15 (.16)	-.054** (.012)	4.22* (1.62)	.87	10.81***	1.88	15 Oregon Counties; O.L.S.

Standard Errors in parentheses.

* = Significant at 90% confidence level.

** = Significant at 95% confidence level.

*** = Significant at 99% confidence level.

Two-tailed test for all variables.

O-W = Durbin Watson

O.L.S. = Ordinary Least Square

Table 18. Matching Mental Health Grant Equations: Dependent Variable is Amount of Matching Grants received Per Person by Oregon County Mental Health Programs (Gmh), 1975-1976

Equation	MNE	N_{t-1}	INC_{t-1}	UNE	POP_{t-1}	PSY_{t-1}	SUB_{t-1}	TR_{t-1}	CONSTANT	Adj. R_2	F	D-W	Sample; Estimation Procedure
17.1	.0207 (.0674)	.0001 (.0004)	-.000059 (.000093)	.271*** (.109)	-.0000023 (.0000094)	-.326 (.617)	-.0316 (.0897)	-.0035 (.01)	.556 (1.325)	-.082	.735	1.218	17 Oregon Counties; O.L.S.
17.2	.309*** (.081)	-.00075* (.00032)	.000136* (.000061)	.271*** (.068)	.000016** (.0000065)	-1.16** (.363)	-.0377 (.059)	-.018* (.008)	-1.67* (.86)	.83	10.43***	2.27	16 W. Oregon Counties; O.L.S.
17.3	-.011 (.071)	.000616 (.00048)	-.0001 (.00008)	-.126 (.133)	-.000082** (.000028)	1.425 (1.14)	.261 (.145)	.023 (.011)	2.51 (1.47)	.50	2.51	2.54	13 E. Oregon Counties; O.L.S.

Standard Errors in parentheses.

* = Significant at 90% confidence level.

** = Significant at 95% confidence level.

*** = Significant at 99% confidence level.

Two-tailed test for all variables.

D-W = Durbin Watson

O.L.S. = Ordinary Least Square

Table 19. Federal Staffing Grant Equations: Dependent Variable is Amount of Staffing Grants Received Per Person by Oregon County Mental Health Programs (Gs), 1975-1976

Equation	MIE	N_{t-1}	INC_{t-1}	UNE	POP_{t-1}	PSY_{t-1}	SUR_{t-1}	TR_{t-1}	CONSTANT	Adj. R_2	F	D-k	Sample; Estimation Procedure
18.1	.8618*** (.142)	-.00016 (.00094)	.00015 (.0002)	.116 (.23)	.0000058 (.00002)	-.265 (1.305)	.123 (.19)	.032 (.0217)	-5.448* (2.80)	.70	9.17***	1.44	29 Oregon Counties; O.L.S.
18.2	.485*** (.079)	.00013 (.00053)	-.00005 (.000094)	.295 (.148)	-.00003 (.00003)	2.72* (1.266)	-.105 (.16)	.016 (.012)	-1.09 (1.624)	.83	8.59**	2.25	13 E. Oregon Counties; O.L.S.

Standard Errors in parentheses.

* = Significant at 90% confidence level.

** = Significant at 95% confidence level.

*** = Significant at 99% confidence level.

Two-tailed test for all variables.

D-K = Durbin Watson

O.L.S. = Ordinary Least Square

Table 20. Estimated Parameters for Non-specialized Staff Equations: Dependent Variable is Full Time Equivalent Mental Health Employees Without Specialized Training Per 10,000 Residents (LNP), 1975-1976

Equation	GS	GMI	GMMH	GU	GN	WP	WNP	N	INC	RES	CB	0 ₁	0 ₂	0 ₃	CONSTANT	Sample; Estimation Procedure
19.1	.151* (.101)	.30 (.53)	.217 (.274)	-.0060 (.0183)	-.0056 (.0114)	.00024 (.00027)	-.00048 (.00057)	-.00038 (.00087)	.00009 (.00017)	2.037 (6.223)	.0081 (.0048)	-	-	-	-.995 (3.719)	26 Oregon Counties; 2SLS
19.2	.116 (.099)	.526 (.457)	.228 (.265)	-.0060 (.0150)	.00083 (.0084)	.00018 (.00024)	-.00032 (.00053)	.00007 (.00076)	.000024 (.00016)	-2.70 (5.056)	.0058 (.00405)	-	-	-	.213 (3.69)	26 Oregon Counties; 3SLS
19.3	-	1.283** (.444)	.442 (.345)	.0156 (.011)	-.0017 (.0061)	-.00011 (.00014)	.00011 (.00020)	.00046 (.00042)	.00018 (.00013)	-6.73 (4.035)	-.0102 (.0064)	-	-	-	.933 (1.897)	16 W. Oregon Counties; 2SLS
19.4	-	1.389*** (.412)	.654* (.326)	.0184 (.010)	.0027 (.00535)	-.000147 (.000122)	.00016 (.000185)	.000604 (.000388)	.000197* (.00012)	-8.59 (3.67)	-.013* (.0058)	-	-	-	1.018 (1.69)	16 W. Oregon Counties; 3SLS
19.5	-.068 (.396)	.061 (.59)	.18 (.53)	-.0048 (.020)	-.0031 (.014)	.00026 (.0033)	-.00048 (.00051)	-.00054 (.00092)	.00018 (.00019)	2.707 (6.82)	.0067 (.0063)	-.69 (2.72)	.26 (.69)	1.04 (.93)	-1.12 (4.37)	26 Oregon Counties; 2SLS
19.6	-.135 (.358)	.335 (.503)	.491 (.502)	.00014 (.015)	-.0042 (.00891)	.00015 (.00025)	-.00045 (.00045)	-.00034 (.00079)	.000085 (.00019)	-1.37 (5.08)	.0052 (.0045)	-.47 (2.47)	-.070 (.649)	1.229 (.916)	1.05 (3.26)	26 Oregon Counties; 3SLS

STANDARD ERRORS in parentheses.

* = Significant at 90 percent confidence level.

** = Significant at 95 percent confidence level.

*** = Significant at 99 percent confidence level.

One-tailed test for GS, GMI, GMMH, WP; two-tailed test for remaining variables.

2SLS = Two Stage Least Squares

3SLS = Three Stage Least Squares

Table 21. Estimated Parameters for Wage Equations for Non-Specialized Staff: Dependent Variable is Average Annual Earnings for Mental Health Staff Without Specialized Training (WNP), 1975-1976

Equation	LNP	N	GS	GMH	GMMH	OWS	POPD	PSY	INC	D ₁	D ₂	D ₃	CONSTANT	Sample; Estimation Procedure
20.1	-91.85 (452.03)	.1705 (.484)	63.879 (133.513)	918.871** (440.323)	40.574 (286.358)	.592** (.289)	-8.994 (6.450)	1576.656 (1153.197)	.222* (.157)	-	-	-	1629.153 (2003.06)	26 Oregon Counties; 2SLS
20.2	-123.368 (409.044)	-.097 (.460)	29.025 (125.450)	890.826** (413.301)	153.082 (274.623)	.506** (.265)	-8.837 (5.593)	1647.517 (1065.014)	.136 (.153)	-	-	-	2763.95 (1897.70)	26 Oregon Counties; 3SLS
20.3	1063.417 (1222.033)	-.0557 (.806)	-	61.458 (975.574)	27.081 (78.260)	.333 (.657)	-13.461 (9.241)	3276.945 (2023.598)	.156 (.400)	-	-	-	3343.386 (4527.519)	16 W. Oregon Counties; 2SLS
20.4	400.968 (1119.128)	.1205 (.793)	-	503.43 (922.378)	-194.778 (747.926)	.666 (.583)	-12.906 (8.475)	2114.162 (1907.753)	.262 (.380)	-	-	-	1356.17 (3959.08)	16 W. Oregon Counties; 3SLS
20.5	-318.60 (528.93)	.027 (.597)	-190.66 (353.38)	815.7* (571.80)	-113.85 (581.98)	.654** (.352)	-11.38 (7.62)	1631.95 (1291.45)	.271* (.197)	-458.81 (2639.06)	385.70 (647.49)	1058.23 (1096.78)	1809.30 (2382.03)	26 Oregon Counties; 2SLS
20.6	-544.08 (421.50)	-.309 (.557)	-306.16 (346.90)	931.64** (518.62)	285.86 (548.57)	.526* (.317)	-7.135 (5.843)	1351.73 (1048.51)	.196 (.191)	463.66 (2538.74)	179.85 (625.35)	1113.46 (1036.50)	2794.13 (2265.53)	26 Oregon Counties; 3SLS

STANDARD ERRORS in parentheses.

* = Significant at 90 percent confidence level.

** = Significant at 95 percent confidence level.

One-tailed test for LNP, GS, GMH, GMMH, OWS; two-tailed test for remaining variables.

2SLS = Two Stage Least Squares

3SLS = Three Stage Least Squares