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THE ECONOMIC THEORY OF FEDERAL GRANTS-IN-AID TO STATE AND LOCAL GOVERNMENTS

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THE ECONOMIC THEORY OF FEDERAL GRANTS-IN-AID TO STATE AND LOCAL GOVERNMENTS

by

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Abstract

THE ECONOMIC THEORY OF
FEDERAL GRANTS-IN-AID TO
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by

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A substantial portion of the literature on public finance is concerned with the changes in the levels of expenditures and/or taxes of governmental units that receive grants from higher levels of government. Until recently, most authors on this subject were concerned with determining whether these intergovernmental flows of revenues caused recipients to increase expenditures on the aided function, or all functions, from their own revenue sources, to use a portion of these funds to reduce local taxes, or to keep total expenditures constant by using some of these grant funds to increase expenditures on unaided functions. It was generally assumed, usually implicitly, that the recipient governmental units would react in a similar manner, in regard to changes in spending/taxing levels, to the grants.

The position taken in this study is that different jurisdiction will respond in different manners to grants-in-aid. To be more specific, it is assumed that the relatively higher income areas would increase

revenues from their own sources more (or decrease these revenues less) than would lower income areas in response to grants from the Federal government. Although the data do not prove the hypothesis conclusively, there are indications that in some instances different areas display different responses to Federal aids.

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CHAPTER I

INTRODUCTION

Growth of State and Local Government Sector

Last year, in the wake of the passage of Proposition 13 in California, which greatly reduced property tax rates in that state, there was a spate of legislative activity to limit or reduce taxes and/or expenditures in many states. Without going deeply into the economics of why large segments of the population believed that state and local taxes should be reduced, it may be assumed that people perceived that state and local tax burdens were growing rapidly, and that the upward trend would continue. While this may be true in some areas, the aggregate data contradict the notion of an ever-expanding state and local government sector.

The table below and the accompanying chart indicate that, in nominal terms, state and local expenditures as a percentage of GNP increased almost continually from 1960 to 1975. Since 1975, the share of GNP devoted to state and local government expenditures has declined (column 1 on table, I on chart). When the effects of Federal grants-in-aid are removed, the trends are clearer. State and local government spending from their own sources, as a percentage of GNP, rose in almost every year from 1960 to 1971. From that point, the trend line is almost flat, with state and local spending from their own sources, as a per-

Table 1

STATE AND LOCAL EXPENDITURES AS A PERCENTAGE OF GNP
1960-1979

Year	Expenditures as a percent of GNP Total expenditures		
	Nominal	Real[1]	From own sources
1960	9.8%	11.6%	8.5%
1961	10.4	12.1	9.0
1962	10.3	11.8	8.9
1963	10.6	12.0	9.0
1964	10.8	12.2	9.1
1965	10.9	12.3	9.3
1966	11.2	12.4	9.3
1967	11.9	12.8	9.9
1968	12.3	13.1	10.2
1969	12.6	13.2	10.4
1970	13.5	13.9	11.0
1971	14.0	14.2	11.3
1972	14.0	14.0	10.8
1973	13.8	13.6	10.7
1974	14.4	14.1	11.2
1975	15.1	14.8	11.5
1976	14.5	14.1	10.9
1977	14.1	13.5	10.6
1978	14.3	13.5	10.4
1979	13.9	13.1	10.5

[1]Purchases of goods and services plus subsidies less current surplus of government enterprises divided by implicit price deflator for state and local government purchases of goods and services, 1972 = 100. Transfer payments and net interest divided by implicit price deflator for personal consumption expenditures, 1972 = 100. Sum of deflated purchases of goods and services and transfer payments divided by real GNP.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts of the United States, 1929-1974, pp. 3, 7, 109, 265. Survey of Current Business, July 1978, pp. 26, 40, 61. Survey of Current Business, March 1980, pp. 5, 9, 11. Economic Report of the President, 1979, pp. 183, 184, 186, 187, 269.

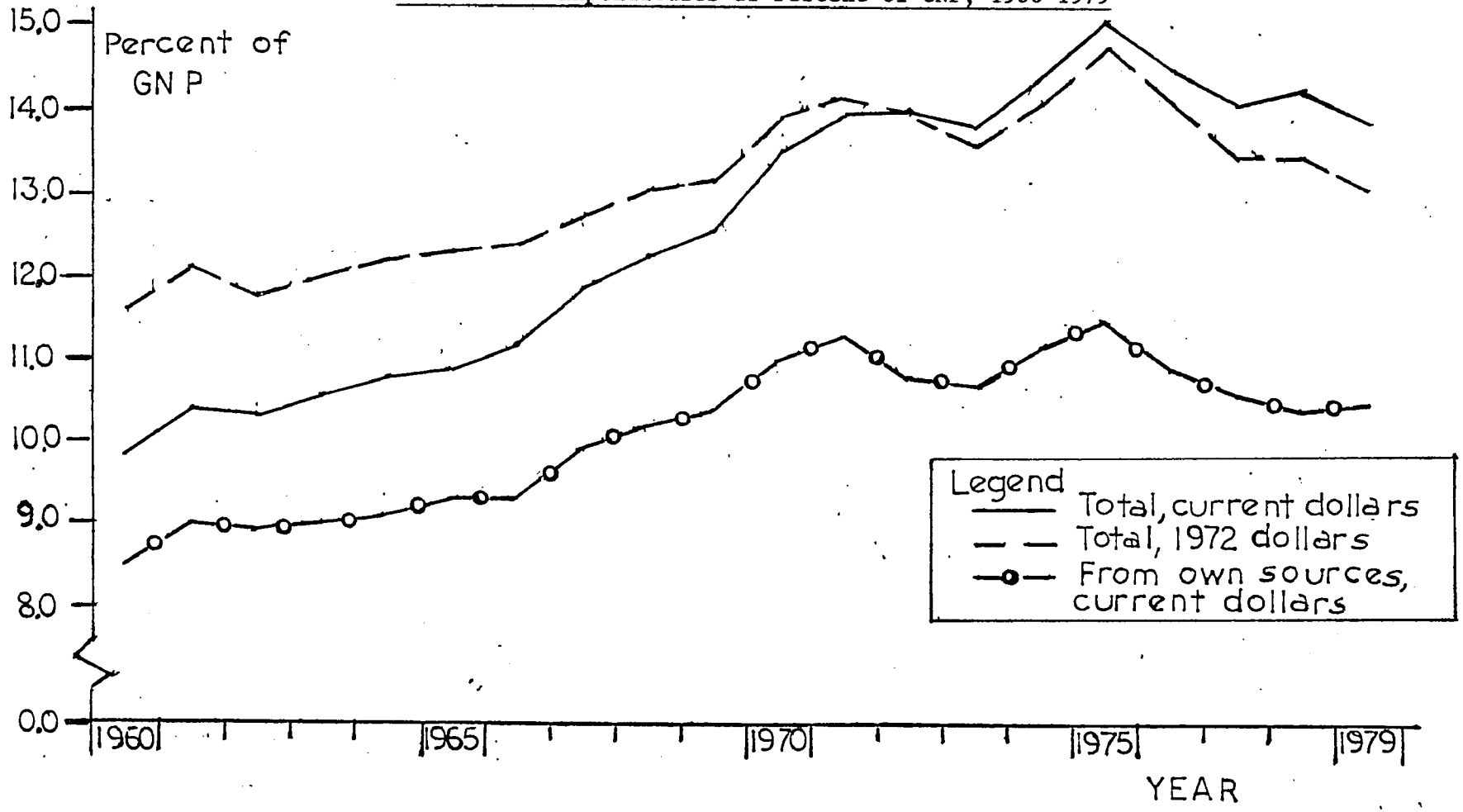
centage of GNP, falling during periods of economic expansion and rising during recessionary periods (column 3 on table and III on chart).

It is conceivable that the secular rise in the share of GNP going for state and local expenditure is due to a relatively greater rate of price inflation for government goods and services than prices in general. Removing the effects of price level changes, (the method by which state and local government expenditures were deflated is given in footnote in table), does not appreciably alter the basic trends. "Real" state and local expenditures, as a percentage of real GNP, (all in terms of 1972 price levels), rose steadily from 1960 to 1971 and then appeared to level off (II on chart, column 2 on table). As with the nominal data, the ratio of "real" state and local expenditures to real GNP fluctuates in an anti-cyclical manner, rising in recessions and falling in recoveries.

From the extremely brief exposition of the evidence presented above, it is not possible to determine the effect of Federal aids to state and local governments on the expenditures of the recipients. During the time period in question, the slope of total state and local expenditures as a percentage of GNP is somewhat steeper than the slope of state and local government expenditures from own sources as a percentage of GNP. This could mean that Federal grants have a depressing effect on the expenditure levels of sub-national governments. It is not inconceivable that the reverse is true; i.e., Federal grants have stimulated spending by state and local governments during this time period. Another plausible explanation is that Federal grants have had no impact on spending levels of state and local governments. Utilizing the data presented

CHART I

State-Local Expenditures as Percent of GNP, 1960-1979



Source: Table 1

here it is not possible to draw any inferences as to the impact of Federal grants on state and local government expenditures.

To be sure, this is not the first time that the question, "What is the effect of Federal grants on the spending and/or taxation decisions of state and/or local governments?" has been asked. This dissertation addresses itself to this question, although in a somewhat different manner. Rather than using national aggregates to attempt to answer this question, this paper relies on a more disaggregated approach. It is assumed here that due to differences in demographic and socioeconomic factors among the recipient governments, different areas will respond differently to Federal grants (this assumption is explored more deeply in subsequent chapters). If this assumption is true, the use of national aggregates would yield misleading answers to this question since their use assumes that no significent differences in response to Federal grants exist among receiving governments. Also, if it is assumed that significant differences in response to Federal grants do exist among sub-national units of government, this paper tries to determine why these differences should exist. That is, what are the demographic and socioeconomic factors that give rise to the differences in response to Federal grants.

Definition

Prior to discussing the effects of Federal grants on the expenditure decisions of state and local government units, it is advisable to define the term grants-in-aid. Aid from the central government to sub-national governmental units may take many forms, such as the provision of certain technical services; loans at below-market rates of interest; allowing certain non-business related state and local taxes

as either deductions or credits from Federal income tax liability; excluding interest on state and local securities from Federal income taxation; sharing revenues; certain payments in lieu of taxes on Federal land or property holdings;[1] and, of course, grants-in-aid. For the purposes of this study, only grants-in-aid, and their impact on the spending decisions of the recipient sub-national governmental units, will be explored. Briefly, Federal grants-in-aid to state and local governments include: direct cash grants to state and local government units, to other public bodies established by these units (or to their designees), outlays for grants-in-kind such as commodities distributed to governmental institutions, and payments to certain regional authorities and commissions.

The other forms of Federal aid mentioned in the preceding paragraph may also affect state and local government taxing and spending decisions. Provisions of certain technical services or advice to sub-national units releases funds that may have been spent for private consulting services or for the provision of these services by the state or local agencies involved. Direct loans from the central government at below-market rates of interest act as indirect subsidies by lowering borrowing costs, which may stimulate state and local spending or

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[1]Shared revenues are the portion of Federal receipts from such activities as cattle growing, timber harvesting, or lease payments for the mining of mineral deposits on Federal land holdings which are turned over to state or local governments; the payments are made in lieu of property taxes on these holdings. In areas where Federal properties yield no revenues but do reduce the property tax base of local areas, the Federal government does, to some extent, compensate the local governments for the services they must provide and the taxes lost. It may be argued that these payments are not truly forms of aid. If those governments which receive the payments could have received more revenues in the form of taxes on Federal holdings then the payments they do receive, the foregone tax revenues could hardly be construed as aid from the Federal government.

possibly reduce taxes (or postpone or revoke scheduled tax increases). Exempting the interest on securities issued by the sub-national governmental units also acts as interest subsidy by allowing them to borrow at lower rates of interest than private concerns (assuming the risks involved are similar). The allowance on non-business related taxes to be deducted from gross income reduces a family's or an individual's Federal income tax liability, the amount depending on the taxpayer's level of income. Accordingly, those responsible for making budgetary decisions on the state and local level may decide to raise certain taxes with the knowledge that a portion of the tax increase will be borne by the central government in the form of reduced income tax liabilities (assuming the Federal government does not impose new taxes or increase existing tax rates in order to counteract this revenue reduction). It is estimated that the exclusion of interest on state and local government debt reduced Federal tax revenues by approximately $5.4 billion for fiscal year 1977; and the deductibility of non-business state and local taxes further reduced Federal tax revenues by $11.1 billion in that year.[2] Federal direct loans to state and local governments in that year were $331 million.[3] In terms of either direct outlays by the Federal government or foregone revenues, the above-mentioned forms of aid amounted to approximately $16.6 billion in fiscal year 1977. While this is not an insignificant sum of money, it is about one-fourth of the total of grants-in-aid to

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[2]Executive Office of the President, Office of Management and Budget, Special Analyses, Budget of the U.S. Government, Fiscal Year 1979, p. 160.

[3]Ibid., p. 199.

state and local government disbursed in that year--approximately $67.6 billion.[4]

Brief History of Grants and Impact on State and Local Budgets

The history of Federal grants to state and local governments in the nation is a long one, dating back to 1785, when Congress, under the Articles of Confederation, provided land for educational purposes in the Northwest Territories. In 1862, the first of the Morill Acts provided land for colleges of agricultural and mechanical arts; in 1890, the second Morill Act provided $25,000 per state for support of these colleges. This was increased to $50,00 per year, per state, under the Nelson Act of 1907. The first modern grant was established under the Smith-Lever Act of 1914; this law incorporated certain features that characterize most modern grant programs: 1) an apportionment formula for distribution among the states, 2) state required matching ratios, and 3) advance approval by the Federal government of state plans. Two years later, a grant program for highway construction was passed with similar provisions. With the passage of the Social Security Act in 1935, new grant programs were established for the purposes of income assistance. While the number of new grant programs continued to increase, the major spurt of legislative activity in this area came in the mid-1960's with the Great Society programs. From the first grant program, this system has grown tremendously; in fiscal year 1977, the Treasury Department lists approximately 100 separate grant programs.[5]

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[4]Ibid., pp. 191-197.

[5]Department of the Treasury, Division of Government Accounts and Reports, Federal Aid to States, Fiscal Year 1977.

Although some form of Federal grants to states and local governments has existed since the founding of the country, their impact on the finances of the recipient governments has generally been slight, until recent times. Prior to the 1930's, grants were, on the average, approximately 2.1 percent of state and local general revenues.[6] With the onset of the Depression of the 1930's, emergency grant programs for public works and income maintenance caused grants to reach a peak of 10.1 percent of state and local revenues in 1936.[7] During the 1960's, grants as a proportion of state and local revenues averaged approximately 7.0 percent (7.9 percent of revenues raised by state and local governments).[8] These proportions had risen to 8.6 percent and 9.4 percent, respectively, in the 1950's.[9] The seventeen-year period from fiscal year 1960 to fiscal year 1977 has seen an extremely rapid increase in levels of these aids, from $7.0 billion to $62.6 billion, or an average annual growth rate of 13.8 percent.[10] As a percentage of total state and local revenues, these intergovernmental transfers have increased from 11.6 percent in 1960 to 18.5 percent in 1977.[11] However, the impact of these transfers on state and local finances is not uniform among all states; for example, in fiscal year 1977, grants as a percentage of state and local general revenues for

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[6]U.S. Department of Commerce, Bureau of the Census, 1977 Census of Governments, Historical Statistics, on Governmental Finances and Employment, Vol. 6, No. 4, pp.39-41.

[7]Ibid. [8]Ibid. [9]Ibid.

[10]Ibid., p. 39 and U.S. Department of Commerce, Bureau of the Census, Governmental Finances in 1976-77, p. 16.

[11]Ibid., p. 39 and p. 18

the 48 coterminous states ranged from 31.3 percent in Maine to 17.9 percent in Connecticut.[12] The range was even greater in fiscal year 1960; in that year, grants as a percentage of state and local general revenues were 7.2 percent in New Jersey and 31.9 percent in Wyoming.[13]

Effect of Grants on Federal Expenditures

As with state and local finances, grants have, up until recent years, played a small role in Federal finances. In the table below, the relationships between Federal grants and Federal outlays is shown. During the period from 1950 to 1970, the growth in grant outlays outpaced both total Federal outlays and state and local spending. However, during the 1970's, the growth rate of grants nearly matched the growth rates of other forms of Federal spending and also of state and local spending.

With grants-in-aid accounting from more than one-fifth of domestic Federal expenditures, one question that comes to mind is: Does the expenditure of nearly $70 billion (in fiscal year 1977) achieve the goals set out by the legislation which set up the grants? Another question which arises from the data as shown is: Due to the political difficulty of ending many of these programs once instituted, how much inflexibility is built into the annual Federal budget? It is estimated by the Federal budgetary authorities that over 60 percent of total domestic outlays were uncontrollable in 1977.[14] While no attempt is made in this dissertation to answer these questions, they are of more than trivial importance.

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[12] Governmental Finances, p. 25.

[13] Census of Governments. pp. 39-41.

[14] Executive Office of the President, Office of Management and Budget, Budget of the United States Government, Fiscal Year 1979, pp. 470-471.

Table 2

HISTORICAL TREND OF FEDERAL GRANT-IN-AID OUTLAYS
Selected Fiscal Years

	Total grants	Composition of grants-in-aid: Grants for payments to individuals	Composition of grants-in-aid: Other	Federal grants as a percent of Federal outlays: Total	Federal grants as a percent of Federal outlays: Domestic[1]	Federal grants as a percent of State and local expenditures
	millions					
1950.....	$ 2,253	$ 1,421	$ 832	5.3	8.8	10.4
1955.....	3,207	1,770	1,437	4.7	12.1	10.1
1960.....	7,020	2,735	4,285	7.6	15.9	14.7
1965.....	10,904	3,954	6,950	9.2	16.6	15.3
1970.....	24,018	8,867	15,151	12.2	21.1	19.4
1971.....	28,109	10,789	17,320	13.3	21.4	19.9
1972.....	34,372	13,421	20,951	14.8	22.8	22.0
1973.....	41,832	13,104	28,728	16.9	24.8	24.3
1974.....	43,308	14,030	29,278	16.1	23.3	22.7
1975.....	49,723	16,106	33,618	15.2	21.3	23.2
1976.....	59,037	19,511	59,526	16.1	21.8	24.7
TQ.....	15,909	5,122	10,787	16.8	22.7	25.7
1977.....	68,396	23,002	45,394	17.0	22.8	26.4
1978 estimate.....	80,288	25,151	55,137	17.4	23.1	27.5
1979 estimate.....	85,020	27,190	57,830	17.0	22.7	26.2

Source: Executive Office of the President, Office of Management and Budget, Special Analyses, Budget of the U.S. Government, Fiscal Year 1979, p. 164

Other Problems Associated with Grants

Aside from the problems associated with the administration of these complex programs, other problems, or at least the potentiality of other problems, exist in grant programs. The first problem associated with grant programs is the possibility of the misallocation of labor resources, i.e., grants may cause uneconomic migration. Under present law, each state is free to set benefit levels for public assistance programs. If benefit levels between two jurisdictions are greater than the differences in living costs between them, and recipients migrate to the higher benefit area, this could be considered uneconomic migration, although the recipients are better off. To the extent that the present system of grants allows these interstate differences to occur, any migration of persons from one area to another for the sole purpose of obtaining higher benefits should be considered uneconomic since those who migrate for this reason do not increase their productivity. Although there is little evidence that any large scale migrations have occurred for the purposes of obtaining higher public assistance benefits, there is some evidence that the differences in benefit levels may inhibit some economic migration, which may be inefficient.[15] Federal grants for purposes other than public assistance may also inhibit potential economic migration. By reducing the tax costs of providing services in these depressed areas, these grants may induce some unemployed or low income residents to remain in those areas rather than migrating to areas where

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[15]The present system does not induce significant levels of interstate migration from Southern states to Northern states for blacks, but does inhibit migration of whites from Northern states to Southern states. See John F. Kain and Robert Shafer, "Income Maintenance, Migration and Regional Growth, Public Policy, 20 (Spring 1972), p. 223.

their productivity may be higher. It should also be noted here that grants may inhibit uneconomic migration. By narrowing the difference of tax costs of providing equal levels of services, grants may inhibit some persons from migrating in order to improve their fiscal surplus. Assuming the costs of providing a service is the same in two jurisdictions, in the absence of grants, the higher income area could provide levels of public services identical to those provided in the lower income area but at lower tax rates. (Similarly, with equal tax rates, the higher income community could provide higher levels of services.) Some families may be induced to migrate to the higher income area in order to enjoy the same levels of public services at lower tax rates.[16]

Another potential problem arises as to the equity of certain grant programs. Assume we have two communities which are very similar in regard to average income levels and the distribution of income, but differ in their valuations of public goods vis-a-vis private goods. Under the system of matching grants, whereby the central government will match a certain proportion of the lower level government's expenditures for certain functions,[17] the local community with relatively greater preferences for public goods will spend more for public goods, and thus receive more

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[16]Whether this is uneconomic migration is subject to debate. If those families who do migrate do not improve their productivity it could be considered uneconomic. However, since the goal of society is to maximize utility, achieving more services at lower prices, everything else remaining the same, such a move will increase the utility of the migrants. In metropolitan areas, this is akin to the well-known Tiebout effect, i.e., "voting with one's feet." See Charles N. Tiebout, "A Pure Theory of Local Expenditures," Journal of Political Economy, 64, (Oct. 1956), pp. 416-424.

[17]The underlying rationale for "matching" grants will be discussed more fully in the next chapter.

grants;[18] if we can further assume that the central government displays a high degree of horizontal equity in its tax structure, the tax liabilities to the central government for those of similar income levels will be similar. Thus, those in the community which shows a greater preference for private goods in relation to public goods may argue that they are being treated unfairly. Tax liabilities, to the central government, of families with similar income levels in both communities would be almost identical, but those families in the community displaying relatively greater tastes for public goods would receive proportionately greater benefits from the central government. That is, families in one community would be subsidizing the consumption of public goods in the community displaying relatively greater tastes for public goods than private goods.

This argument, however, is not necessarily a valid one if there are benefit "spillovers" or externalities associated with the provision of a certain locally produced service or group of services. If the residents of the community in which a relatively greater preference for public goods versus private goods is displayed can be induced to expand the output of these goods, by means of matching grants, to the point where residents of other localities benefit from the actions of the recipient unit of government, then the central government is not necessarily only aiding the consumption of locally provided services in that community which values public goods to a somewhat greater extent than other areas. Those residents of outlying areas who benefit from the expansion of output of the locally provided services of jurisdictions which

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[18] It is further assumed that the costs of providing a unit of public services is the same in both communities.

received the grants can be considered as recipients of the grant to the other jurisdiction, albeit indirectly. They are receiving the benefits of public services provided by another community and they are not being taxed by that community, in the way of locally imposed taxes, for their share of the benefits received. Consequently, their argument concerning the equity issue of grants rests on the assumption that they are cognizant of increased tax liabilities to the central government to finance the grants, but claim that they are not receiving any of the benefits from the expansion of the output of the services which are due to the grants. However, if those claiming inequitable treatment by the central government are aware of the benefits accruing to them from the expansion of output of the services provided by another jurisdiction, they can press for reductions in locally imposed taxes to reduce the quantity of output of these services provided by their jurisdictions (with a resulting decrease in grants received). The resulting equilibrium in both jurisdictions may be similar to a Lindahl[19] solution whereby each member of the group bears that proportion of the total cost of the desired level of social goods at which the marginal rate of substitution for public goods versus private goods is equal to the respective price ratios. In this case the total tax price may be thought of as the sum of local tax shares and tax shares to the central government. If the cost of providing the service or services in question is identical for local governments and central governments, it may be more efficient to have those services

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[19]A description of the Lindahl solution of the problem of assigning tax shares to taxpayers for the provision of public goods is given in Richard A. Musgrave, The Theory of Public Finance (New York: McGraw-Hill Book Co., 1959), pp 74-80.

provided by the central government since the relationship between tax price and benefits received may be clearer than having the tax price divided between local taxes and central government taxes. On the other hand, if local governments can provide these services at lower cost than the central government, allowing local governments to provide these goods and adjusting the amounts that each locality would produce in isolation by means of taxes to and grants from the central government would be the more efficient mode of producing these services.

A third major area of contention concerning the role of grants-in-aid is that these aids alter priorities of the recipients as to program choices because it is assumed that state and local governments will be induced to spend more on aided programs than on unaided programs. Briefly, the argument states that the conditions and matching ratios of Federal grant programs distort the fiscal priorities of state and local governments.[20] As will be shown in the subsequent chapters, this altering of state and local government fiscal priorities is not necessarily a flaw in the grant system, but may actually increase the efficiency in the provisions of governmental services.

A crude example of the distortion of the fiscal priorities of state and local governments is shown in the table below. In the first column, total state and local government expenditures, as they appear in the national income and product accounts, are presented. The second column shows the amounts spent by these governments for the various

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[20]See Deil S. Wright, Federal Grants-in-Aid: Perspectives and Alternatives (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1968), p. 7.

functions from locally-raised taxes or user charges.[21] If grants caused no alteration of priorities, the percentage distribution of expenditures by broad function would be almost identical for both columns. Alternatively, if grants were of the matching variety, that is, the level of aid from the donor government were a constant proportion of the donees' expenditure on that function, the combined income and substitution effects would yield a new equilibrium consistent with an income elasticity of unity. (See chart I in the appendix to this chapter.)

As shown from the data in the table above, the various Federal grant-in-aid programs do alter, in some instances to a considerable extent, the fiscal choices of state and local governments. Assume, for the sake of simplicity, that the $266.6 billion of state and local expenditures in 1977 represents the equilibrium desired level of expenditures and that no grant programs exist. In order to keep the budget priorities from being altered, assume that the percentage distribution of expenditures would be the same in the last two columns in the table above. Thus, for example, expenditures of public assistance and relief would be approximately $19.7 billion rather than the $48.8 billion as shown in the table. Conversely, under this assumption, total expenditures for education would be approximately $126.4 billion rather than the actual $105.9 billion. From the two examples provided, some critics of the

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[21]Receipts from revenue sharing programs were allocated to the various functions according to the distribution of expenditures from own sources excluding employee retirement and worker compensation benefits. The negative figure in column 2 stems from the fact that many state and local government programs run surpluses where grants are added to their receipts; and that the designation of expenditures, as they relate to whether they are Federal or state or local, do not always coincide.

Table 3

STATE AND LOCAL GOVERNMENT EXPENDITURES
Calendar Year 1977
(Dollar amounts in millions)

Function	Amount		Percent of total	
	Total	From own sources[1]	Total	From own sources[1]
Central administration and management	$ 33,829	$ 32,566	12.69	16.35
Education	105,864	94,465	39.71	47.41
Elementary and secondary	73,434	65,391	27.54	32.62
Higher	25,246	23,187	9.47	11.64
Other	7,184	5,887	2.70	2.95
Health and hospitals	24,181	20,279	9.07	10.18
Public assistance and relief	37,770	14,751	14.06	7.40
Civilian safety	20,106	18,706	7.54	9.39
Transportation and commerce	21,262	14,262	7.97	7.16
Highways	19,838	13,355	7.44	6.70
Other	1,424	907	.53	.46
Utilities and sanitation	9,533	4,651	3.58	2.33
Agriculture	1,573	873	.59	.44
Natural recources	7,237	6,163	2.71	3.09
Other	5,270	-7,474	2.08	-2.75
Total	$266,625	$199,242	100.00	100.00

[1]State and local government expenditures less Federal grants-in-aid.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, July 1978, p. 36.

grant system would argue that the grants caused the recipient governments to divert resources from education to public assistance. A counter-argument may be made if it assumed that the desired level of state and local expenditures is $199.2 billion; but the true preference structure is shown in the third column rather than the fourth column in the above table. Using this line of reasoning, if left to their own devices, public welfare and relief expenditures from their own locally raised funds would have been approximately $28.0 billion rather than the actual $14.8 billion; and expenditures from education in 1977 would have been $79.1 billion and not the $94.5 billion shown. In this case, some would argue that the grants caused a diversion of funds from public welfare to education. The examples presented above represent an oversimplification of the measurement of the level of distortion in the preferences of state and local governments. There is no reason to assume that as revenues rise all exepnditures would rise by the same proportion. However, as is argued by the critics of the grant system, the different matching ratios and conditions attached to the various programs would tend to induce the budget authorities to alter their priorities towards those programs which receive relatively more aid.

Purpose of Dissertation

Briefly, the purpose of this dissertation is to determine the degree to which Federal grants-in-aid to state and local government units stimulate spending by the recipients, and whether the recipient units will respond differently from one another. Although a more complete analysis and a formal statement of the hypothesis is presented in the third chap-

ter, it is necessary at this point to provide some definitions and a short description of the analysis.

The impact of grants-in-aid on the spending decisions of the receiving unit may be categorized in three ways: 1) additive, 2) substitutive, and 3) stimulative. If a grant program is deemed to be additive, it implies that the grants have no impact on the spending decisions of the receiving government. In other words, if community A is willing to spend from locally raised revenues the amount of $X, a grant from a higher level of government would not change the initial spending decision at all. On the other hand, if, because of the receipt of grant funds, community A were to reduce the amount it is willing to spend from its own funds, the grant would be deemed to be substitutive. In the third case, if expenditures from locally raised funds were to be increased because of the receipt of the grant, the grant is thought of as stimulative.

Most of the literature on this subject has dealt with the question of whether a particular grant program stimulated spending by the receiving government on that function or not, or whether the grant system on the whole stimulated total spending by the receiving jurisdiction.[22] However, the question of whether Federal grants-in-aid to state and local governments are stimulative, substitutive, or additive is not necessarily the most important economic question that may be asked. Recent studies, using public choice models, have shown that responses to the same grant

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[22]See Edward Gramlich, "The Effects of Federal Grants on State-Local Expenditures, a Review of the Econometric Literature," Proceedings of the National Tax Association, 1969, pp. 569-583.

programs, in terms of changes in recipient expenditures, may vary significantly among the receiving units.[23] In this paper, the purpose is to determine if significant differences in regional responses, as measured by either tax effort or revenue effort,[24] to Federal grants-in-aid exist; and, as far as possible, to ascertain the reasons why these differences should exist.

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[23]See, for example: D. A. L. Auld, "Provincial Grants and Local Government Expenditure," Public Finance Quarterly, 4, (June 1976), pp. 295-306; H. M. Hardy, "Budgetary Response of Individual Governmental Units to Federal Grants," Public Finance Quarterly, 4 (April 1976), pp. 173 ff.; Larry Orr, "Income Transfers as a Public Good: An Application to AFDC," American Economic Review, 65 (June 1976), pp. 368, 369.

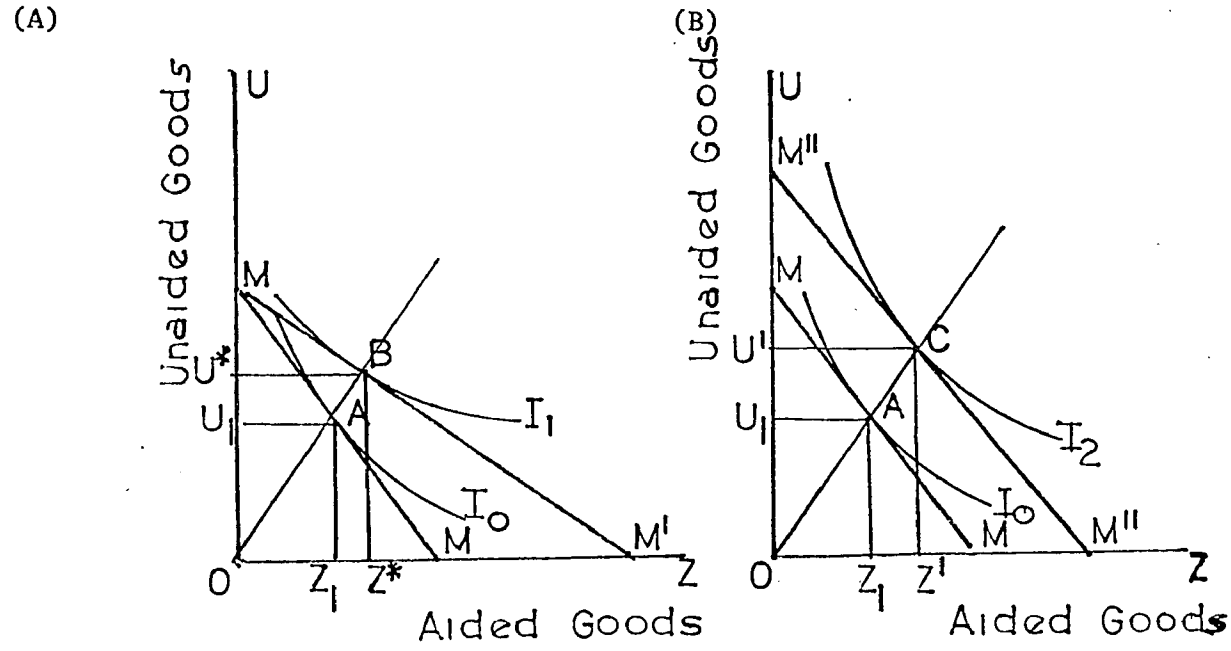
[24]Tax effort is defined as total tax revenues as a percentage of state Personal Income; revenue effort is defined as total general revenues from own sources as a percentage of state Personal Income. See U.S. Department of Commerce, Bureau of the Census, Governmental Finances, annual.

APPENDIX TO CHAPTER I

As mentioned earlier, certain critics of grants programs argue that grants "distort" the budget making decisions of the receiving units of government. These critics are implying that, in the absence of intergovernmental transfers from higher units of government, the local units of government would generally choose that proportion of total resources devoted to the production of local public services that is the optimal proportion. Also, it is further assumed by these critics that once the overall optimal level of public services is decided upon, the mix of services and goods provided most accurately reflects the desires of the electorate.

In order to develop the criticism of grants programs more fully, we turn to the chart below. For expository purposes only, it is assumed

Figure 1: "Non-Distorting" Federal Grants-in-Aid



that there are only two public goods to be produced at the local level: unaided goods and aided goods. It is further assumed that one unit of aided good can be transformed into a unit of unaided goods at constant costs so that the constraint is a straight line (it is also assumed that the total level of public goods produced is optimal). If grants were not to distort the preferences of the electorate, the recipient governments would devote the same proportion of total resources available to each of both types of goods both prior to and after the receipt of the grants.

In both panels, budget constraint MM represents the optimal level of total public goods to be produced and choices as to the mix of goods facing the budget makers in the absence of grants. Initially, the community, through voting on various budgets, chooses OU_1 units of unaided goods and OZ_1 units of aided goods, point A. In panel A, the grant is of the matching variety whereby the donor level of government bears a constant proportion of the donee's expenditure on aided goods. In panel B, the grant is of the non-matching variety, whereby the donor level of government provides a lump-sum amount to the recipient government. After the receipt of either type of grant the new equilibrium points are point B for matching grants and point C for non-matching grants. In panel A, the community chooses OU* units of unaided goods and OZ* units of aided goods. In panel B, the community chooses OU' units of unaided goods and OZ' units of the aided goods. In both cases presented here: $OU'/OZ' = OU^*/OZ^* = OU_1/OZ_1$. There is no reason to assume that points B and C will represent the post-grant preferences of the recipient units of government.

CHAPTER II

FEDERALISM AND THE ROLE OF GRANTS IN A FEDERAL SYSTEM

Fiscal Federalism

In as few words as possible, since this is not a treatise on federalism per se, fiscal federalism may be defined as a system in which the sub-national units of government have revenue raising and spending powers independent of the central government. Although Federal systems are generally political systems in that the powers of the national government, and the sub-national units of government, are usually spelled out in a national constitution or other body of law, economic reasons for federal systems do exist. Basically, the underlying premise for the economic theories of federalism is that, under certain conditions, sub-national levels of government are more efficient providers of public services than the central government. The primary condition for having certain public goods provided by sub-national levels of government is that the benefits be limited in geographic area. Whether the services provided by the local governments are pure public goods, as illustrated by Samuelson[1] or not, as long as only a small sub-set of the entire population enjoy the benefits, it is more efficient to have these services

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[1]Paul A. Samuelson, "The Pure Theory of Public Expenditures," Review of Economics and Statistics, 39 (Nov. 1954), pp. 387-389.

provided by the jurisdiction in which the sub-set of the population reside. A second condition, as stated by Oates,[2] is that as long as local governments can provide these services at the same or lower marginal cost than can the central government, it is more efficient to have them provided by the local government.

Under the two conditions listed above, a federal system of government should lead to a more efficient pattern of production of public and private goods than a unitary system, i.e., a system of government in which almost all public services are provided by the central government. First, by allowing different sub-sets of the population to consume different levels of public services, the choices available to families as to the quantities of public services and the tax price of those services are greatly increased, which increases their welfare. Thus, as in the Tiebout[3] model, with all other things held constant, families would then be free to choose the community which offered them approximately the best combination of public services and tax rates for their preferences. Secondly, if these services are provided at lower marginal cost than they can be provided by the central government, the different sub-sets of the population consume the desired levels of services at lowest cost. Again, this will lead to a higher level of welfare than if a

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[2]Wallace Oates, Fiscal Federalism (New York: Harcourt, Brace, Jovanovich, 1972), p. 35.

[3]Charles M. Tiebout, "A Pure Theory of Local Expenditures."

uniform level of services were consumer, and the services were purchased at a higher tax price.[4]

The Role Of Grants in a Federal System

1. Matching Grants

One of the major functions of grants-in-aid from higher to lower levels of government is to promote a more efficient pattern of production and consumption of locally provided public services. As is often the case, local governments will not provide the optimal[5] levels of certain public goods because they are not able to fully recapture the entire amount of benefits generated by their provision of these goods. This inability to recapture, for their citizens, the full benefit generated by the expenditures on certain public goods arises from the fact that the geographic incidence of the benefits of public expenditures rarely coincides with the political boundaries of the jurisdiction providing the public good. If, for example, the benefits of the public expenditure for a certain good accrue to persons residing outside of the political boundaries of the jurisdiction providing that service, and the jurisdiction providing the service cannot exact compensation from those outside for the benefits they receive, then the locality providing the service would tend to provide less than the optimal level of the service. The supplying jurisdiction would attempt to provide that level of service at which the

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[4]If the tax price for the public good is identical whether it is provided by the central government or the local govnerment, and if the uniform level of services as would be provided by the central government differs from the desired level of services, the decentralized system tends to increase welfare.

[5]"Optimal," according to the higher levels of government.

benefits to its residents equal the costs. For example, if a community dumped its raw sewage into a nearby river, its residents and the residents of communities downstream bear the costs, in terms of lower quality of water, etc., of these actions. If the residents of downstream communities cannot exact compensation from the upstream community which is dumping its sewage into the common river, they bear the costs of the negative externality. Should a higher level of government force the offender to treat its sewage, the offending jurisdiction would, in the absence of any incentive, expend that sum which is necessary to equate the cost of sewage treatment to the benefits received by its citizens from these expenditures. While the residents of downstream communities would derive some benefits from those expenditures, they would, in all probability, still be subject to the negative externalities mentioned above. A matching grant from a higher level of government is one method which may induce the offending jurisdiction to increase its expenditures on treatment facilities in order to reduce the costs incurred by the downstream communities.

As demonstrated by Wilde,[6] matching grants are more likely to stimulate spending on the aided function by the recipient government unit than the equivalent lump-sum, or non-matching, grant. This is due to the fact that grants of the matching variety have both income and substitution effects, while non-matching grants have only an income effect. That is, the matching grants reduce the price of the aided function vis-a-vis all other services, thus making the aided function more attractive

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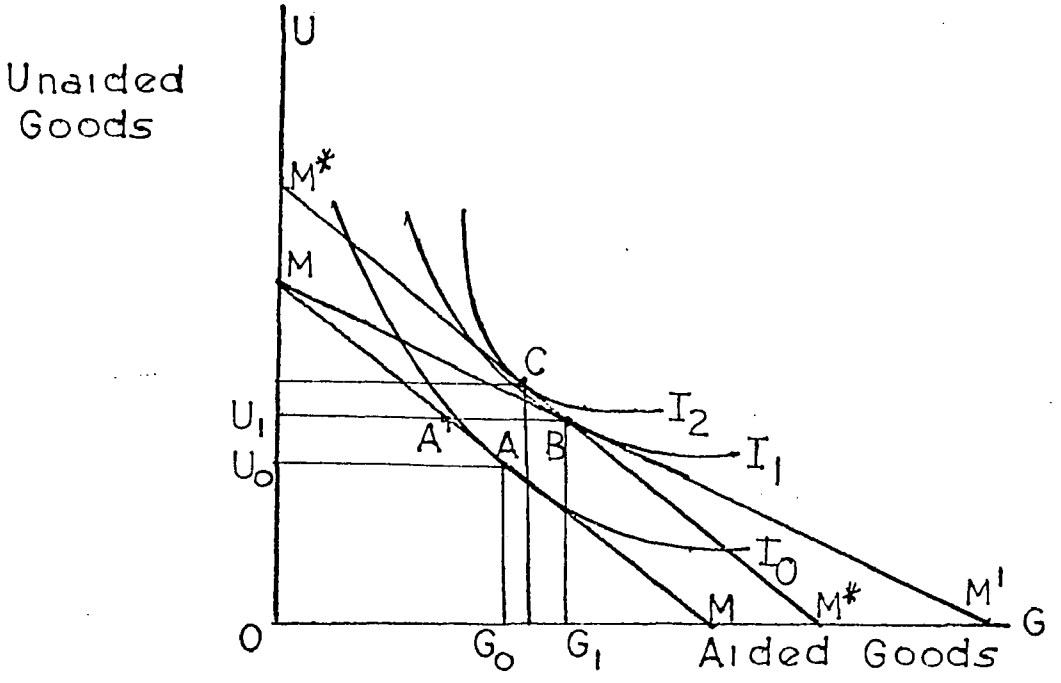
[6]James A. Wilde, "Grants-in-Aid: The Analytics of Design and Response," National Tax Journal, 24 (June 1971), pp. 143 ff.

relative to the unaided functions in the eyes of the local budget authorities. Perhaps this may be seen more clearly in the graph below.

Figure 2: Equilibria with Matching and Non-Matching Grants



Assume the axes have been scaled correctly so that a unit of the unaided good may be transformed at constant cost into a unit of the aided good, and that the equilibria shown represent the residents' desires as to the levels of services to be consumed. From Figure 2, the community is initially in equilibrium at point A, choosing OU_0 and OG_0 units of the unaided goods and aided goods, respectively. A matching grant from a higher level of government, which changes the community budget constraint from MM to MM', leaves the community with a new equilibrium B (OU_1 and OG_1 units of the unaided and aided goods respectively). The grant to the community in actual units of aided goods is A'B. The new budget constraint for the community is M*M* if the grant is of the non-matching variety; in terms of actual units of aided goods, it is equivalent to the

matching grant since this budget constraint contains point B. If the community indifference curves are convex to the origin, the community could attain a higher level of welfare if it moves from point B to point C, for example.[7]

2. Lump-Sum Grants

Although the analysis above demonstrated that matching grants, rather than lump-sum grants, are more likely to induce receiving units of government to provide levels of public goods which are closer to the optimal level than would be the case without any grants, the economic rationale for non-matching or lump-sum grants remains. The primary reason for having block or lump-sum grants is that, due to the wide variation in average income levels that exists among communities, poorer communities would be required to impose higher tax rates than wealthier communities in order to provide identical levels of public goods. If it is desired that all families consume at least a minimum level of public services, block grants to poorer areas would lessen the disparity in fiscal resources among the communities.[8]

A corollary goal of the grant system is to produce horizontal equity in taxation among individuals rather than among local political jurisdictions. Assume, for the moment, that the central government and all sub-national units of government have achieved horizontal equity in taxation. However, when all public budgets are totaled, there may be

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[7]A similar conclusion is reached using individual taxpaying units rather than communities as a whole. For further details see: Oates, Fiscal Federalism, p. 105 ff.

[8]As mentioned earlier, one of the consequences of providing these grants may be to induce unemployed or underemployed workers from migrating to areas where their productivity may be higher.

wide variations in total taxes borne by taxpaying units with very similar incomes. As a hypothetical case, assume there are two communities A and B with similar average levels of income and distributions of income. In community A, a family with an income of $15,000 per year pays $2,000 in taxes to the local government, while a family with the same income in community B pays $1,500 per year in taxes to its local government. Furthermore, assume that each family with this income pays $3,000 per year to the central government in taxes. Thus, while all families with incomes of $15,000 per year pay taxes of $3,000 to the central government, those families in community A pay a total of $5,000 per year in taxes while those in community B pay $4,500 per year in taxes. In an extremely simple case, the central government would increase the tax levy on those $15,000 per year families by $250 and give the proceeds to community A so that, in order to provide the same level of public services, local taxes on other families with $15,000 income could be reduced by $500.[9] Thus, in community B, the $15,00 per year family would have a total tax burden of $4,570--$3,250 to the central government and $1,500 to the local; the $15,000 per year family in community A would bear the identical tax burden.

According to Breton,[10] lump-sum grants perform an additional function. In those localities where non-benefit types of taxation are

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[9]If the costs of providing the public services are identical in both communities so that the initial differences in taxes represented differing evaluations of public goods vis-a-vis private goods in the two communities, the case for overall horizontal equity in taxation is not very clear.

[10]Albert Breton, "A Theory of Government Grants," The Canadian Journal of Economics and Political Service, 31 (May 1965), p. 184.

utilized to finance public services, the loss in utility from foregoing the consumption of private goods will not equal the gain in utility from consuming the non-private goods. By reducing the amount of local tax revenues needed to finance any given level of public expenditures, lump-sum grants help to equalize the gains and losses of utility.[11]

Alternatives to Grants

As noted earlier, the system of Federal grants-in-aid to state and local governments is not without its critics. If the present system of grants were to be scrapped, what are some of the possible alternatives to take its place? Possibly the most obvious answer would be to reduce Federal taxes by the amount that would be spent for grants. With the additional disposable income now enjoyed by the citizens, state and local governments would increase their taxes and thus provide more services without the so-called strings. According to Oates,[12] if each taxpayer were given a credit on his or her Federal income taxes equal to the taxpayer's share of the block grant which would have been given to the community, under simple majority voting procedures the resulting choice between the share of total resources devoted to private goods and to public goods would be identical to the choice if the sums were given to the local government. If each taxpayer were given a tax credit on his Federal income tax liability equal to a certain proportion of the tax-

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[11]Since these grants must be financed either by increasing the tax levies of the higher level of government, or reduction of the services provided by the higher level of government, or debt creation, it is not clear that on an overall basis the loss in utility due to consuming less is now equated with the gain in utility from consuming public goods.

[12]Oates, Fiscal Federalism, p. 108.

payer's local tax bill, this would produce the same results as if a matching grant were given to the local government. However, if Federal income taxes were reduced by the same proportion as the proportion of grants to income tax receipts, the disparities is fiscal resources would be widened rather than narrowed. In this case, those communities with relatively lower average incomes would be forced to increase their tax receipts proportionately more than the relatively wealthier communities in order to provide the same increase in public services.

If it were desired that each person consume at least a minimum level of public services, there is no assurance that this goal would be attained if Federal taxes were reduced, and the sub-national levels of government were not required to provide the minimum levels. One possibility is that the Federal government could fund the minimum level of services necessary and allow the states and local governments to supplement the Federal expenditures from their own funds.[13] However, this last possibility is probably much too complicated to be put into action. Therefore, in order to reduce the disparity in fiscal resources among the various localities and to reduce the impact of benefit "spill-overs," a system of both matching grants and lump-sum grants is probably a more efficient method of providing a more nearly optimal level of public services than the alternatives.

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[13]To some extent the Supplemental Security Income program is financed in this manner. The Federal government pays the basic stipend while the states are free to supplement the basic benefits to the levels they deem appropriate.

CHAPTER III

HYPOTHESIS

Statement of Hypothesis

In contrast to the vast majority of published studies on the effect of grants from higher to lower levels of government on the expenditures of the lower-level unit which attempt to illustrate whether grants are stimulative, substitutive, or complementary,[1] this study attempts to show that regardless of whether Federal grants-in-aid to state and local governments are stimulative, substitutive or complementary, different local jurisdictions will respond differently to the same grants. That is, while a grant or grants in general may be stimulative (or substitutive or complementary) in all jurisdictions receiving such aid, the degree of stimulation may vary significantly among them. It is also possible that grants may stimulate expenditures in one local government, but substitute for local expenditures in another Stated somewhat more formally, it is expected that grants in general, and

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[1]Using Gramlich's definitions, a grant is considered substitutive if the change in outlays on the grant-aided goods is less than the amount of the grant. A stimulative grant is one where the change in expenditures on the grant-aided goods is at least equal to the amount of the grant. For a good to be deemed complementary, the change in expenditures on the grant-aided goods must be at least as large as the legal matching ratio. See Edward Gramlich, "The Effects of Federal Grants," p. 573.

social welfare[2] type grants in particular, will be relatively more stimulative in higher income areas than in lower income areas. The underlying rationale for this hypothesis will be discussed at greater length in a subsequent section after a brief digression as to why it is possible for the identical grant program to have a different impact in different localities.

Grants in a Public Choice Paradigm

Utilizing a variation of Oates'[3] analysis and Black's theorem,[4] it is possible to demonstrate how identical grants from a higher level government to lower levels can have dissimilar effects on two different communities. In Oates' analysis, the objective was to prove, under strict circumstances, that lump-sum or non-matching grants would yield a lower equilibrium level of provision of public goods than an equivalent (in money terms) matching grant. To illustrate this point, Oates proved that a lump-sum grant to the community is equivalent to giving each taxpayer an amount equal to the product of his or her tax share and

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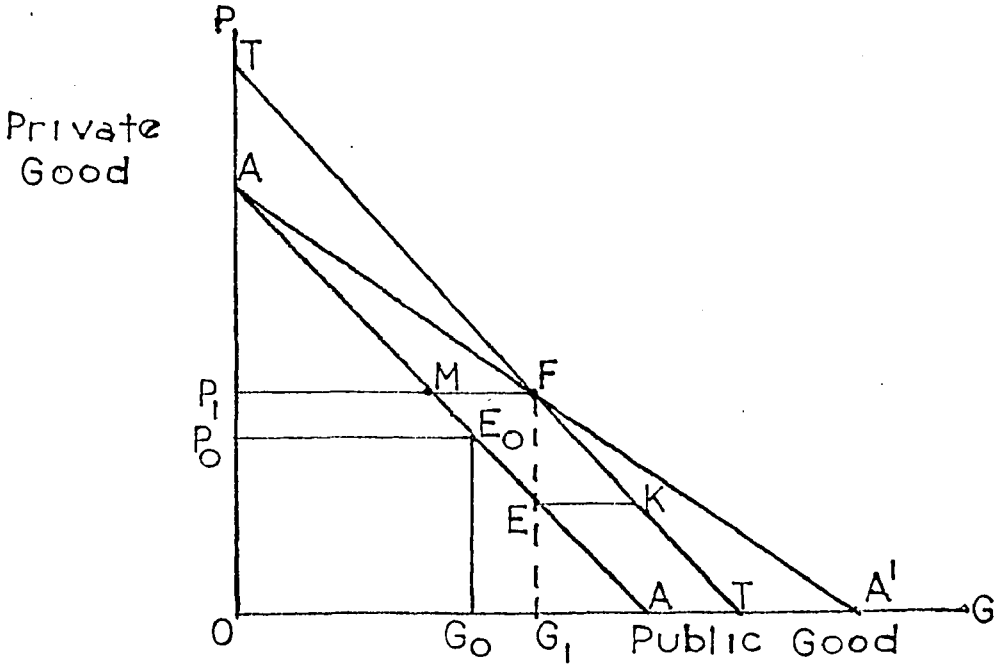
[2]See Sophie R. Dales and Alfred Skolnick, "Federal Grants-in-Aid to State and Local Governments," Social Security Bulletin, 39 (October 1974), pp. 34-36.

[3]Oates, Fiscal Federalism, pp. 105-118.

[4]If preferences are single peaked and political decisions on budget making are adopted by simple majority voting, the equilibrium budget is the median peak or the median of the most preferred levels of provision of the public good. The budget preferred by the median voter is the only one that can get at least (n/2+1) votes out of n votes case when paired against any other budget. See Duncan Black, "On the Rationale of Group Decision-Making," Journal of Political Economy, 56. (Feb. 1948), pp. 23-24.

the amount which would have been granted to the community. To put it more simply, the amount of the grant to the community is divided among the taxpayers according to their respective shares of the local tax bill. A grant to the community which matches a constant proportion of the local government purchase of the public good is equivalent to allowing each taxpayer a credit against the tax liability to the grantor government equal to the matching proportion of the taxpayer's local tax bill. Referring to Fig. 3, it is clear that when faced with a disturbance to his equilibrium state, the taxpayer will always opt for a larger public budget when given the choice between a lump-sum and a matching grant; this is so because the matching grant has both income and substitution effects while the non-matching grant has only an income effect. If h is the slope of the budget constraint facing the taxpayer, refunding a constant proportion of the taxpayer's local tax bill shifts his budget constraint to AA' where the new "tax price" for a unit of public good is now h(1-m), where m is the proportion of the local tax bill refunded (or credited against the tax liability to the grantor government). With fixed tax shares and simple majority voting, the new equilibrium budget is OG_1, the implicit grant to the taxpayer is EF_i, and the EF_i is equal to EK, which is equal to FM. If, however, instead of a matching grant, a lump-sum grant of EF_i were given, the new budget constraint for taxpayer i would be TT. Under these conditions, the taxpayer i would opt for a lower total public budget than he would have under the matching grant program; assuming, of course, that our hypothetical taxpayer is rational.

Figure 3: Equivalence of Grants to Local Governments and Tax Credits to Families



The usefulness of this analysis is that it proves that, under certain conditions, individuals react to grants in the same manner that would be expected of the local governmental authorities without resorting to the construction of community indifference curves. Similarly, the question could be asked whether, when faced with a disturbance to their equilibrium, the median voters in two different communities could react differently to identical grant terms. The answer is, of course, yes. In ordinary theories of consumer choice we allow different individuals to react differently to either income or price changes, so it is true with the choice between public and private goods. The question asked here is: What are the characteristics of the median voter in different communities that would enable us to predict how they would react to changes in their respective equilibria when faced with a disturbance

due to an increase in their disposable incomes due to the receipt of grants?

Explanation of Hypothesis

As stated earlier, grants tend to be relatively more stimulative in higher income areas than lower income areas. That is, in the more affluent localities, the median voter would choose to devote a greater proportion of the increase in disposable income to the consumption of public goods than would his or her counterpart in the less affluent area. This statement would appear to be almost a restatement of Wagner's Law,[5] that is, when incomes rise, relatively greater proportions are spent on the consumption of public goods.[6] There are, however, valid reasons for believing this to be true. Political models such as the one presented by Banfield and Wilson,[7] show that under certain conditions higher income voters tended to vote for higher public budgets than did lower income individuals. Using data on voting referenda in Chicago and Cleveland, the authors found that mainly upper income Protestants and Jews tended

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[5]See R. M. Bird, "Wagner's Law of Expanding State Activity," Public Finance, 26 (No. 1, 1977), pp. 1-26.

[6]It should be noted that using cross-sectional analysis that this statement is not necessarily true. While there is a significant correlation between per capita Personal Income and per capita state and local general expenditures (.682) in fiscal year 1977, there is no significant relationship between per capita Personal Income and state and local general expenditures per $1,000 of Personal Income. However, there is a significant relationship between per capita Personal Income and state and local general expenditures from own revenues (.280). Basic data from Bureau of the Census, Governmental Finances in 1976-77, pp. 64, 68, 69.

[7]Edward C. Banfield and James Q. Wilson, "Public Regardingness as a Value Premise of Voting Behavior," American Political Science Review, 58 (Dec. 1964), p. 885.

to be more "public regarding" than other citizens.[8] The authors assert that these groups did not vote in their narrow self interest by weighing the potential benefits and the increased tax burden for themselves but looked to the welfare of the community as a whole. This notion was deduced from the fact that these groups were less favorably disposed toward increases in benefits for veterans and civil servants which they regarded as beneficial to small groups and not the whole community.[9] Of course, the concept of public regardingness for economists is not a meaningful one; these groups voted their self interest as they perceived it, and thus could be considered as selfish as their fellow citizens who were not deemed to be "public regarding." Fry and Winters[10] did, on the other hand, find that political variables such as indexes of malapportionment, legislative professionalism, inter-party competition, etc. were more important in explaining interstate variations in redistribution[11] than were socioeconomic variables. Furthermore, the authors found that the degree of redistribution and state per capita Personal Income were correlated.[12] While this does not explicitly show that higher income

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[8]Since these referenda voting patterns are for two cities, the "political" variables were held constant and only demographic differences were significant, Ibid. p. 886.

[9]Ibid., p. 887.

[10]Brian P. Fry and Richard F. Winters, "The Politics of Redistribution," American Political Science Review, 64 (June 1970), pp. 508-522.

[11]Redistribution, for their purposes, is defined as the ratio of benefits of government expenditures to revenue burdens for the lowest three income classes. Ibid., p. 509.

[12]Ibid., p. 511.

areas would tend to spend a greater share of increased fiscal resources due to the receipt of grant funds on public goods than would less affluent areas, it does, to some extent, show that higher income areas are somewhat more willing to aid lower income groups than lower income areas. Thus, as grants for social benefit increased faster than other types of grants, it would be logical to assume that the higher income areas would be more willing to supplement Federal funds from their own sources than would lower income areas.[13] Although Fry and Winters used political variables to illustrate their point, Sullivan,[14] on the other hand, found that the political variables are not more important than socioeconomic variables in explaining interstate differences in the redistribution of state expenditures. Both Hofferbert[15] and Dye[16] found that, due to the

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[13]As pointed out in the article by Hochman and Rodgers, the average level of income is not necessarily a determinant of relative preferences for redistribution of income within a political jurisdiction. According to the authors, the determinants of taxes and transfers necessary achieve the Pareto optimal distribution are the initial, i.e., pretaxed transfer, differences in income and different pairs of taxpayers, the shape of the size distribution of income, and the elasticity of demand for transfers, an indicator of the "taste" for redistribution. In this paper, it is assumed that the relatively higher income areas would display relatively greater preferences for redistribution than lower income areas; and that the shape of the size distribution of income would be amenable for distribution in that a relatively smaller proportion of the population would be eligible for transfers. See Harold Hochman and James D. Rodgers, "Pareto Optimal Redistribution," American Economic Review, 60, part 1 (Sept. 1969), p. 549.

[14]John L. Sullivan, "A Note on the Politics of Redistribution," American Political Science Review, 66 (Dec. 1972), p. 1303.

[15]Richard I. Hofferbert, "The Relation Between Public Policy and Some Structural and Environmental Variables in the American States," American Political Science Review, 60 (March 1966), p. 179.

[16]Thomas R. Dye, Politics, Economics, and the Public Policy Outcomes in the American States (Chicago: Rand-McNally, 1966). p. 208.

high degree of multicollinearity among many of the political variables and socioeconomic variables, the political variables exert no independent influence on the outcome of state taxation and expenditure policies. Thsu, the political factors such as inter-party competition, apportionment of the legislatures, and indexes of professionalism in both the executive and legislative branches of government are too highly correlated with socioeconomic variables such as income levels, degree of urbanization, and degree of industrialization to yield reliable estimates of the influence of political variables. According to Hofferbert, however, one factor in these models was not taken into account--diversity. The greater the degree of diversity within a state as regards levels of income, population distribution between rural and urban areas, etc., the greater the levels of spending. Hofferbert[17] attributes the greater spending in more diverse states to the fact that in those states there are no cohesive political blocs to limit taxation and spending. In more polular political jargon, the squeaking wheels get the grease, and the greater the diversity, the greater the number of squeaking wheels.

Models using only economic variables, in a framework of public choice decision making, tend to bolster the argument that grants from higher to lower levels of government are more stimulative in higher income areas than in lower income areas. Two separate studies, by Hardy[18]

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[17]R. I. Hofferbert, op. cit., p. 77.

[18]H. M. Hardy, "Budgeting Response of Individual Governmental Units to Federal Grants," Public Finance Quarterly, 4 (April 1976), pp. 173-175.

and Auld,[19] using Canadian data, show that grants in general, and social welfare grants in particular, are more stimulative in higher income areas than in lower income areas. Hardy, using Federal grants in the provinces, found that provincial expenditures for social welfare purposes were stimulative of expenditures in Ontario and British Columbia but not in Quebec or the Atlantic provinces. Auld found that provincial grants to the local government units in Ontario generally were more stimulative in the higher income areas than the lower ones. Orr[20] found that Federal grants stimulated state and local expenditures on AFDC in higher income areas to a greater extent than in lower ones. Using a public choice model, Orr showed that the matching ratio or, in Orr's terms, the marginal price that the state must pay for an increase in AFDC benefits is significant. The income effects of the matching grant were not significant in explaining interregional variations in AFDC benefit levels.[21] Since the author was not using total AFDC expenditures but benefit levels per case, it is impossible to determine whether grants stimulated total expenditures. That is, while the grants may have raised benefit levels, in order to constrain the increase in expenditures the states may have tightened eligibility requirements or used other means to limit any anticipated increases in participation in this program or to actually decrase the recipient case load. Both political and economic

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[19]D. A. L. Auld, "Provincial Grants and Local Government Expenditure," Public Finance Quarterly, 4 (July 1976), pp. 295-306.

[20]Larry Orr, "Income Transfers as a Public Good: An Application to AFDC," American Economic Review, 66 (June 1976), pp. 368, 369.

[21]Ibid., p. 370.

theory and studies tend to show that higher income areas would react differently from less wealthy localities when faced with grants by devoting a relatively greater share of the grant funds for public consumption and relatively less for tax reduction. A description of the model and methodology employed will be presented in the next chapter.

CHAPTER IV

METHODOLOGY

Description of Dependent Variables

As opposed to most other studies on this subject, which measure the degree of stimulation provided by Federal grants (or state grants to local governments) by the extra expenditure brought forth in reponse to the receipt of the grants, this dissertaion employs two measures of fiscal effort as the object of the study: tax effort and revenue effort. Tax effort and revenue effort are defined as the ratio of tax receipts per $1,000 of state Personal Income and general revenues from own sources per $1,000 of state Personal Income.[1] Rather than measuring the degree of stimulation due to grants in terms of additional dollars of expenditures, these measures allow us to take average income levels into account. For example, if identical grants to two communities stimulate an addi-

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[1]Taxes, as defined by the Bureau of the Census, include income taxes (personal and corporate), death and gift taxes, property taxes, general sales taxes, specific excise taxes, motor vehicle license taxes, motor vehicle registration fees, business license taxes, and other taxes not elsewhere classified. General revenues from own sources include taxes plus current charges for services (tuition at state or local universities, school lunches, hospital fees, sewerage, public housing, parking facilities), interest earnings, sales of property and other sources. Excluded are receipts for publicly owned utilities, publicly owned liquor stores, and insurance trust fund services. See U.S. Department of Commerce, Bureau of the Census, Governmental Finance in 1977-78, Series GF78, No. 5, p. 17.

tional $.60 of spending in both, the degree of stimulation may still be different in the two communities; if the grant required an additional $1 per capita increase in revenues from local sources, the locality in which average income was $10,000 would have to increase tax rates, or other means of raising revenues, to a much lesser extent than would the community where average income was $5,000. Another reason for using measures of fiscal effort rather than per capita expenditures or revenues as the dependent variables has to do with the proper budget decision-making variables. It does not seem likely that those who are responsible for the adoption of public budgets at either the state or local level of government are interested, to any great extent, in the per capita level of taxes, revenues, or expenditures. It seems more reasonable to assume that once the proper level of expenditures is decided upon, those responsible for financing the public budget would be more interested in the mix of taxes and other sources of locally raised revenues and the tax rates necessary to finance a given level of expenditures. The use of measures of fiscal effort based on Personal Income captures, to a far greater extent, the proportion of total community income or wealth that must be diverted to the public treasury in order to finance desired expenditures.[2] As stated previously, the measures of

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[2]Measures of fiscal effort based on Personal Income may not always represent the proportion of private incomes which are diverted to public uses. Some areas which include industries which are, for the most part, geographically immobile can obtain large amounts of revenues and still maintain low tax rates on local businesses and individuals. One example of this form of tax reporting may be illustrated by examining, in a cursory manner, the finances of the state of Louisiana. This state which ranks fairly high among the states in fiscal effort, based upon Personal Income, finances a large part of its expenditures by means of severance taxes on natural resources, mainly oil and natural gas; in 1977 approximately 22.2% of the general revenues from state raised funds

fiscal effort based on Personal Income, tax effort and revenue effort, are used in order to account for the wide variation among the states as to the proportion of total state and local revenues accounted for by taxes or charges for current services and miscellaneous revenues.[3] It should be noted here that the basic purpose of this dissertation is to demonstrate that different political units will respond differently to Federal grants as measured by changes in state and local tax effort or revenue effort. No policy-making jurisdiction labeled state and local governments exists; that is, the state-local government aggregate is an artificial construct, not a political arena where decisions are made. Sharkansky and Hofferbert[4] assert that only the responses to Federal grants of state governments should be examined since the state-local government aggregate does not exist. While it would be possible to limit the analysis to state responses to Federal grants, there are certain reasons why the use of the artificial construct of the state-local government aggregate is useful. First, although the largest

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were from severance taxes. If it may be assumed that the greater proportion of these taxes are passed on the the final consumers of products manufactured from those resources; and, if it may be further assumed that residents of Louisiana consume only a small fraction of the total output, then most of the burden of the severance taxes is borne by the residents of other states. See U.S. Bureau of the Census, State Government Finances in 1977, pp. 18-23.

[3]Charges for current services and miscellaneous general revenues, as a percentage of total general revenue from own sources, ranged from 15.8% in Connecticut to 35.0% in North Dakota in 1976-77. See Governmental Finances in 1976-77, pp. 20-22. The U.S. average was 21.2 percent.

[4]Ira Sharkansky and Richard I. Hofferbert, "Dimensions of State Politics, Economics, and Public Policy," American Political Science Review, 63 ((Sept. 1969), pp. 867-8.

portion of Federal grants is initially channeled through state governments, much of these funds, after some mixing with state funds, is rechanneled through to the local governments. Although the conditions under which states make grants to local governments may differ from the conditions of Federal grants, and the distribution of state grants may differ from the distribution of grants if the Federal government distributed the funds directly to the localities within the state, it does seem reasonable to assume that, at least indirectly, local governments do respond to Federal grants. Furthermore, since the middle 1960s, a growing proportion of Federal grants has been distributed directly to local governments;[5] therefore, studies concentrating solely on state government responses to local grants would be neglecting a growing proportion of Federal grants. One point should be noted: no attempt is made here to determine whether local government responses to Federal grants would differ from state government responses to the same Federal grant. It is possible that the use of the state-local aggregate as the decision-making unit does obscure important differences in the relative stimulation provided by Federal grants.

The use of measures of fiscal effort based on Personal Income in this study differs only slightly from those which use either per capita expenditures or per capita revenues. An illustration of how the changes in fiscal effort may differ between two communities when each is confronted with the same grant is shown in Fig. 4 below. Assume it is

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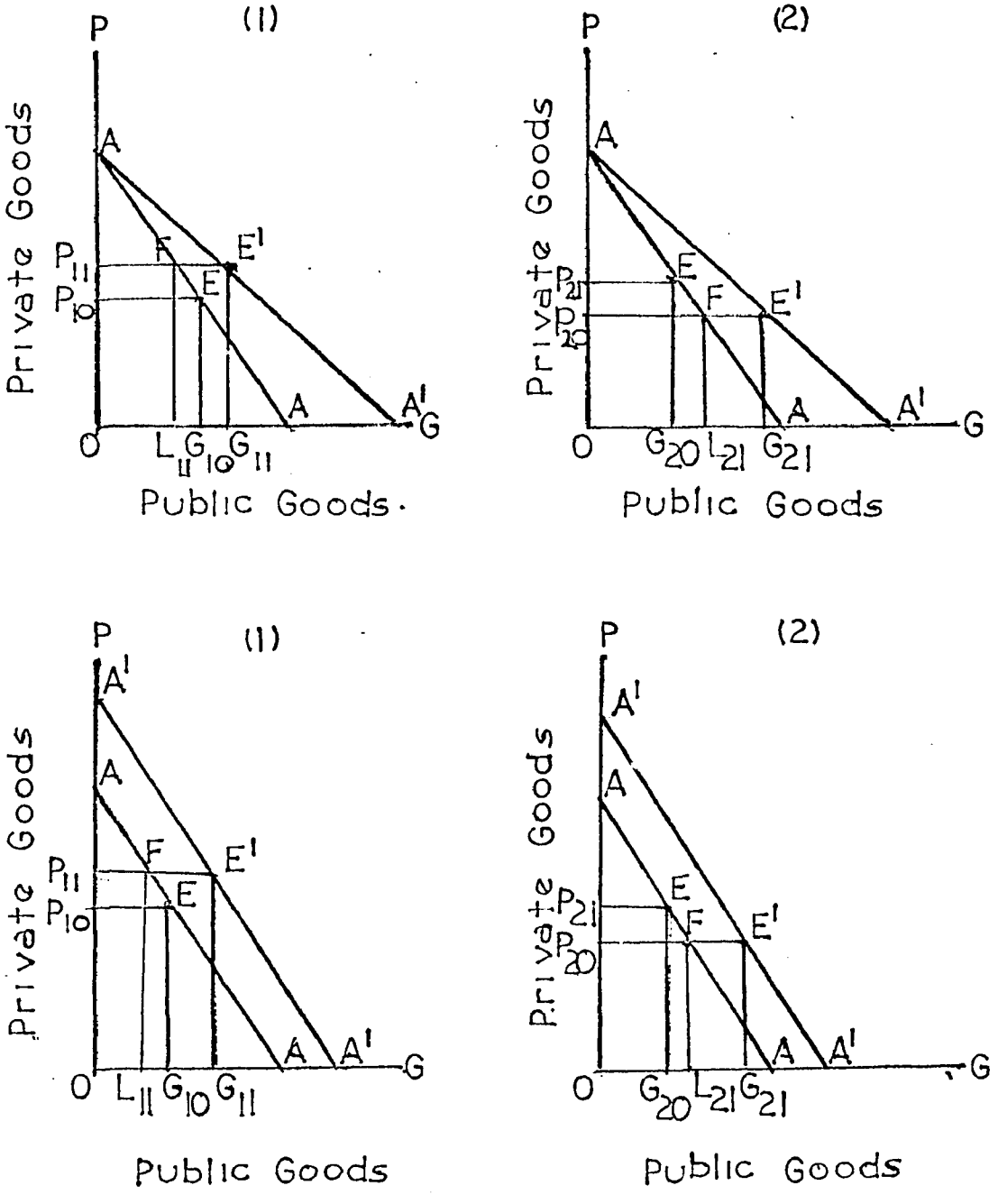
[5]Federal payments to local governments as a percentage of total Federal payments to state and local governments were 9.2, 12.8, 15.1, 28.6, amd 29.6 percent in fiscal years 1960, 1965, 1970, 1975, amd 1977, respectively. See U.S. Bureau of the Census, Governmental Finances in 1959-60, p. 17; 1964-5, p. 21; 1974-75, p. 19; and 1976-77, p.26.

Figure 4: Relative Degree of Stimulation of Fiscal Effort in Two Communities Due to Receipt of Federal Grants



possible to adjust the relative prices of public and private goods for both communities 1 and 2 so that each community faces identical budget constraints. Initially, community 1 consumes OG_{10} of and OP_{10} of the public good and of the private good, respectively, while community 2 consumes OG_{20} and OP_{20} of the public good and private good. Thus, the measures of fiscal effort in community 1 is OG_{10}/OA and in community 2 it is OG_{20}/OA. Now let us assume that the central government gives a grant to each community which will match dollar for dollar their own spending on the public good, so that the new budget constraint is AA'. After deciding how to reallocate their fiscal resources, the voters in community 1 now choose to consume OG_{11} and OP_{11} of the public and private good, respectively, while the voters in community 2 decide the optimal combination of public and private goods is OG_{21} and OP_{21}. Although the consumption of the public good increased in both communities, the response to the grant as measured in the change in fiscal effort differs markedly. In community 1, the proportion of total incomes diverted to public use from their own sources has gone from OG_{10}/OA to OL_{11}/OA, a reduction in local fiscal effort, while the opposite is true in community 2. In this instance local fiscal effort has increased from OG_{20}/OA to OL_{21}/OA. The bottom panel illustrates the same pattern of response in the two communities to a lump-sum grant rather than a matching grant. If the grant were in the lump-sum category, the denominator for measuring the changes in local fiscal effort in the two jurisdictions would be OB. One consequence of the decision to give voters of those communities a grant is neglected here, that is, the means of financing these grants. If the grant were financed in such a manner as to impose an

equal amount of Federal taxes on the citizens of each community so that both original budget constraints shifted in an identical manner, then it is possible to make the ex-post comparisons. However, should the increase in Federal tax liabilities, in the aggregate, differ, or should the same aggregate Federal tax increases be distributed among the citizens so that the shifts in budget constraints differ, this analysis becomes much more difficult.[6] However, due to added difficulties in measurement, this complication is neglected in the analysis. It is assumed that the recipients of the grants do not take the financing of these expenditures into account. That is, budget decision-makers do not estimate the increased Federal tax liabilities imposed on their citizens in order to finance any increase in Federal grants.

Description of Independent Variables

It would be unreasonable to expect that only Federal grants-in-aid can affect state and local fiscal effort. The most obvious factor other than Federal grants that may affect the proportion of total resources which are channeled through the public sector is Personal Income or, rather, per capita Personal Income. It is to be expected that the relationship bewteen per capita Personal Income and state and local fiscal effort would be a direct one. That is, over time, as both nominal and real per capita income rise, there would be a noticeable increase in proportion of their income that people would wish to channel through the public sector. While this is certainly not the place to present a dynamic model of social and economic changes brought about by

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[6]Should these grants be financed by equivalent reductions in Federal expenditures rather than by decreasing taxes, the shift in the budget constraints between the two communities could also differ.

rising incomes, it is fairly safe to assume that rising real income and increasing urbanization and industrialization occur almost simultaneously. As the society becomes more urbanized, the demand for more public services would probably increase; increasing congestion with concomitant increases in health problems and crime and other problems would lead to icnreases in the demand for better roads, police, sewerage, hospitals, etc. Also, the increase in urbanization leads to increasing impersonalization of society; some of the functions carried out by individuals or religious institutions, such as charity, would tend to be carried out by government in large towns or cities. In other words, although the relative amounts of resources transferred among individuals may not change, the shift of the charitable functions from private sources to public ones would in itself increase the measured share of the public sector's use of financial resources. Along with the changes taking place as described is the shift from agricultural production to the production of manufactured goods and services. As the production of the latter type of goods generally requires somewhat more education than production of primary goods, there is an increased demand for schooling, much of which is done through public means. Although the economic, social, and demographic changes described and their impact on the relative share of the public sector to the total level of economic activity take place over a period of many years, perhaps generations, it is true that, at least in the more economically developed nations, the proportion of total economic activity accounted for by the public sector has increased.[7] However, as mentioned previously, there is a marginally sig-

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[7]See Elliott Dubin, "The Declining Public Sector: A Comment," National Tax Journal, 30 (Mar. 1977), p. 95.

nificant direct relationship between the level of eonomic development as measured by per capita Personal Income and measures of fiscal effort (see footnote 6, chapter 3), in cross-section.

Over time, changes in the level of population may also have an effect on fiscal efforts. In declining areas or areas of very slow population growth, the society tends to become somewhat older and poorer, thereby requiring more public services. Due to the eroding of the tax base, tax rates must be raised to provide the desired levels of public services. On the other hand, in those areas where population growth is fairly high, the average cost of maintaining the social infrastructure is declining as the capital costs are spread over a growing number of taxpaying units; if the influx of people raises income levels, tax rates may be lowered. It is also conceivable that areas with extremely rapid population growth may be forced to increase tax rates. Should the increase in population outstrip the area's ability to provide increased services, especially those requiring construction of capital facilities such as schools, roads, sewers, streets, hospitals, etc., revenues would have to be increased to pay for those goods. In the short run, much of the cost of these capital facilities may be financed by issuing debt, thus alleviating the need for increasing tax rates. However, increased interest payments may require revenue increases at some future time. Therefore, in those areas where population growth is very slow or is actually declining, tax effort and/or revenue effort would have to increase in order to meet the increasing demand for public services with a declining tax base; in areas of rapid population growth, it is not altogether clear whether increases in fiscal effort, as defined, are necessary to finance the growing demand for public services.

Another factor which may be a determinant of state and local government fiscal effort is liquidity, i.e., short-term assets less current liabilities, excluding the assets and liabilities of employee retirement funds.[8] As with private individuals and businesses, sub-national units of government may wish to keep a reserve in order to meet unfortunate emergencies such as a short-fall in receipts due to a recession or unexpectedly large expenditures. It is expected that the measures of fiscal effort as defined would vary inversely to changes in liquidity; that is, as liquidity falls, in order to maintain some reserve the units of state and local government may attempt to increase taxes to replenish these funds. Conversely, allowing these accumulated surpluses to increase indefinitely could be embarrassing to the elected officials. In this case, to reduce the surplus either new programs would be enacted or some tax reductions granted. Here it is assumed that some combination of new expenditure programs and tax reductions are used to reduce excess surpluses. Thus, this variable, liquidity, is expected to act similarly to a financial wealth variable in consumer behavior theory. As wealth increases, it would be expected that other consumption variables would increase; or the consumer could use this wealth to decrease current income by consuming more leisure time.

For this dissertation, the variable affecting state and local governmental fiscal effort of primary concern is Federal grants-in-aid.[9] Excluded from the analysis are those aids designated shared revenues and

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[8]Bureau of the Census, Governmental Finances.

[9]Department of Health, Education and Welfare, Social Security Administration, Social Security Bulletin, annually 1960-1977.

payments in lieu of taxes since these payments are, to some degree, compensating the state for taxes foregone on Federal land holdings and for foregone rents and royalties in either livestock grazing lands, timber stands, or mineral deposits. These payments, while constituting only a small part of the total Federal aid to sub-national units of

Table 4

FISCAL EFFORT AND PER CAPITA GRANTS
Fiscal Years 1960-1977

Fiscal year	Fiscal effort		Per capita grants
	Tax effort	Revenue effort	
1960.....	9.03%	10.88%	$ 38.31
1961.....	9.39	11.33	37.90
1962.....	9.44	11.45	41.73
1963.....	9.61	11.76	44.39
1964.....	10.35	12.66	51.30
1965.....	10.50	12.89	55.05
1966.....	10.66	13.14	63.90
1967.....	10.55	13.11	73.97
1968.....	10.81	13.45	90.00
1969.....	11.22	13.95	97.83
1970.....	11.66	14.63	115.88
1971.....	11.89	14.87	141.90
1972.....	12.69	15.76	168.95
1973.....	12.95	16.14	204.81
1974.....	12.36	15.68	213.59
1975.....	12.28	15.73	228.83
1976.....	12.47	15.98	268.06
1977.....	12.80	16.25	304.27

Sources: U.S. Department of Commerce, Bureau of the Census, Governmental Finances. Annual; U.S. Department of Health, Education, and Welfare, Social Security Administration, Social Security Bulletin, October 1977, p. 23; U.S. Department of the Treasury, Federal Aid to States, Fiscal Year 1976 and Transition Quarter; U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-25, various issues.

government, are of some significance in total Federal aids in some Western states.[10]

It is expected that state and local fiscal effort and per capita Federal grants would be inversely related, although one may conclude differently from the aggregate data presented in Table 4. It appears from the data shown in that table that both fiscal effort and per capita grants are secularly rising. However, although these variables are correlated, no outright causal relationship can be discerned a priori; other factors, such as secularly rising Personal Income could be the reason for the increase in fiscal effort shown. It would be more logical to assume that the increase in Federal grants, whether given directly to the voters, as in Oates' analysis, or given to the local government would be apportioned so as to provide some increases in the quantity of public goods consumed and some increases in the quantity of private goods consumed.

The variables outlined above by no means exhaust the list of possible factors which may affect state and local government fiscal effort. Such factors as the mix of taxes, the proportion of the recipient's budget accounted for by grants, and the proportion of the total state-local tax receipts accounted for by state-imposed taxes are some other variables that may be of significance. Those states which rely heavily on progressive taxes may find their fiscal efforts increasing without resorting to increasing tax rates as Personal Incomes rise. The proportion of total state-local tax collections accounted for by

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[10]Department of the Treasury, Bureau of Fiscal Operations, Federal Aid to States, annually 1968-1978; and Department of the Treasury, Annual Report of the Secretary of the Treasury.

state-imposed levies may be correlated with fiscal effort on the theory that it is easier to increase state taxes to pay for increased public services than it is to increase local taxes.[11] The share of state and/or local budgets accounted for by grants should exert a negative (subsitutive) effect on fiscal effort; since the quantity demanded of local public services is probably finite, the greater the proportion of those services financed by the central government, the greater the inducement for local officials to reduce local tax rates. How these variables relate to changes in fiscal effort will be discussed more fully in the following sections.

Brief Overview of the Econometric Literature

During the early and middle 1960's there was a substantial increase in both the number of Federal grant programs and the funding of existing grant programs. It was during this period that measuring the impact of these grants on the spending patterns of state and local governments generated a considerable amount of interest among economists and political scientists. Most of the authors used three main variables

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[11]If the local governments rely heavily on property taxation to raise revenues, it would appear logical to assume that raising state taxes--income, sales, etc.--would lead to less voter resistance than increasing property tax rates. Also, many smaller local units are in competition to attract new industry, or at least retain the industry they already have, thus they may be reluctant to increase taxes if it is felt that other localities would not follow. An increase in state imposed taxes would not put any locality at a disadvantage vis-a-vis the other localities within the state or metropolitan area. It should be noted that to some extent, the states are in the bind as they are competing with nearby states to attract or hold industry.

to explain the variance of state and local expenditures, per capita, for a given year: per capita Personal Income, population per square mile, and percent of population residing in urban or metropolitan areas.[12] The use of cross-sectional analyses allowed the authors to hold the structural variables--such as political make-up, prices of goods and services purchased by state and local governments, interest rates--and demographic variables constant.

The first major study using Federal aid to state governments to explain interstate variations in spending was by Sacks and Harris.[13] In addition to the three main explanatory variables mentioned above, Sacks and Harris added per capita aid to state governments and per capita state aid to local units within the state. Direct Federal aids to local units were omitted since they were a negligible amount. The dependent variables used were: total direct general expenditures, highway expenditures, expenditures for health and hospitals, local schools, police and fire (all on a per capita basis). In general, it was found that Federal grants were somewhat substitutive of state and local spending, i.e., that per capita state and local spending increased by less than $1.00 for an additional $1.00, per capita, of Federal aid.

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[12]These variables were the ones used by Fabricant to explain interstate variations in per capita spending levels for specific functions. See Solomon Fabricant, The Trend of Government in the United States Since 1900 (New York: National Bureau of Economic Research, 1952), pp. 121-132.

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

Bahl and Saunders,[14] using the data developed by Sacks and Harris, found that only changes in per capita Federal grants were able to explain the the interstate variations in changes in per capita state and local government expenditures from 1957-1960. The other explanatory variables, changes in per capita Personal Income, changes in population residing in urbanized areas, and changes in public school enrollment, were significant. When these regressions were run for those states with both high per capita Personal Income and high population density, none of the above mentioned variables were significant.

Using basically the same explanatory variables as Sacks and Harris, Osman[15] found that the grants were very stimulative of state and local per capita expenditures. For every $1.00 per capita of Federal grants, per capita state and local total general expenditures, from their own funds, increased by only $0.94. A $1.00 per capita increase in grants for education, according to Osman's findings, increased per capita spending from their own sources on education (local public schools only) by $4.94. An additional $0.18 per capita increase in funding of education was stimulated by a $1.00 per capita grant for all other functions. Finding that grants for all other functions tended to stimulate state and local spending on specific functions, although to a much lesser extent than did grants for the specific function, Osman speculated that this was the reason that unaided functions were stinulated by grants.

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[14]Roy Bahl and Robert Saunders, "Determinants of Change in State and Local Government Expenditures," National Tax Journal, 18 (March 1965), pp. 50-57.

[15]Jack Osman, "The Dual Impact of Federal Aid on State and Local Government Expenditures," National Tax Journal, 19 (December 1966), pp. 362-272.

He reasoned that grants for specific functions freed funds that the recipient governments would have spent on that function and allowed them to increase expenditures on unaided functions.

Limiting his analysis to determining state expenditures, Sharkansky[16] found that for 1963 the interstate variations in per capita state expenditures were explained by per capita Personal Income and per capita state expenditures in the previous year. Thus, Sharkansky reasoned that each year's expenditures were not independent phenomena but depended upon the level of expenditures in prior years. The other independent variables such as the proportion of state expenditures accounted for by Federal grants, tax effort, and the state's share of total expenditures did not explain to a significant degree the interstate variation in per capita state expenditures.

In contrast to the models outlined briefly above, in the 1970's students of the subject of intergovernmental transfers tended to use constrained welfare maximization models to explain how these grants affected local government spending decisions. Gramlich and Galper[17] used a model in which the budgetary decision makers' preferences included four objectives: to increase, in real terms, current expenditures, allowing for the fact that expenditures mandated by higher levels of govvernment may receive lower utilities in the decision makers' eyes than discretionary expenditures; to raise the community's real dispos-

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[16]Ira Sharkansky, "Some More Thoughts About the Determinants of Government Expenditures," National Tax Journal, 20 (June 1967), pp. 171-179.

[17]Edward Gramlich and Harvey Galper, "State and Local Fiscal Behavior," pp. 15-66.

able income through tax cuts rather than increasing pre-tax earnings (the decision makers can take credit for tax cuts, but not for increases in pre-tax earnings); to increase the flow of services from the existing stock of tangible capital; and to increase the flow of services from the stock of net financial assets. As explanatory variables, the authors include changes in exogenous budgetary resources and lagged budgetary resources; mandated grant expenditures; real incomes; relative price of capital; and real capital stock. These variables were included to measure the "need" for expenditures: changes in the school-age population; the ratio of female-headed households (for public assistance expenditure needs); and the robbery rate. Using quarterly data from 1954 through 1972, the authors found that in a steady-state condition increases in grants tended to lead to increases in current expenditures (total) of $0.43 and to tax reductions of $0.57. When the authors pooled cross-section results for ten cities, it was found that in the steady-state, lump-sum grants tended to increase expenditures by $0.25 and reduce taxes by $0.75.

Other studies which use welfare maximization of budget decision makers were those by Hardy[18] and Auld.[19] Hardy assumes that provincial budget makers' utility function is based on provincial disposable income and expenditures generated through the province's own revenues. The budget constraint is basically the resources available to the province, namely, taxes, borrowings and grants. Using time series data, 1948-70, Hardy found that a high-income province, Ontario, and a low-income

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[18]H. M. Hardy, "Budgetary Responses," pp. 173-186.

[19]D. A. L. Auld, Provincial Grants," pp. 295-306.

province, New Brunswick, did respond differently to grants. Auld's study, using municipalities in Ontario, assumed that local utility function includes expenditures on public services, however financed, and disposable incomes. The utility function to be maximized is subject to a budget constraint which includes grants, taxes and borrowings. The pooled cross-section for 15 cities (1969 and 1970) showed that grants were slightly stimulative, and averge incomes were not significant. In the time-series regressions from 1953 to 1970 for the province of Ontario, the results are unclear due to the changes in the structure of grants which were not taken into account.

The models outlined above far from exhaust the econometric literature on the subject. However, it appears that the types of models employed to describe the impact of grants on the spending decisions of sub-national units of government can be thought of as consisiting of two main types. The earlier models generally relied on cross-sectional studies using ad hoc variables such as population density and urbanized population to explain interstate variations in per capita expenditures. Later models attempted to explain how local budgetary decision makers maximized their own utilities subject to certain budgetary constraints. The model presented here is a sort of hybrid, in that the explanatory variables are similar to those used in the earlier models while the method of estimating the impact of grants is similar to that of the later models, i.e., pooled cross-section, time-series. Also, in this model different receiving units are allowed to react differently to the same grants; in other models, it is generally assumed that all units respond in the same manner to the grants.

The Model

As described in previous sections, it has been hypothesized that measures of state and local government fiscal effort are affected by per capita Personal Income, population, per capita liquidity, and per capita Federal grants-in-aid. In mathematical notation, the model may be represented as:

$$FE_i = f(y_i, N_i, L_i, G_i)$$

where FE_i, Y_i, N_i, L_i, and G_i represent fiscal effort, per capita Personal Income, population, per capita liquidity, and per capita grants, respectively. It should be noted here that although most Federal grant-in-aid programs require at least some matching funds from the receiving government units, no attempt it made to measure the impact of the change in the prices of public goods vis-a-vis private goods on state and local fiscal effort. This is not an omission or oversight, but an assumption that any changes in state and local fiscal efforts are due to income effects only. The basis for this assumption is the nature of the grant programs themselves: none of the grant programs of the matching type are open-ended; all have some upper limit. In other words, Congress does not authorize unlimited expenditures for any program. The agencies then allocate funds to each state according to the criteria of the grant program itself. Because of the cap on the amount of funds any state might receive, it is thought that for purposes of estimating the effect of grants on state-local government finances, grants (levels) are the exogenous variable.[20] Only if the receiving unit of government were to use less than the maximum grant allotment would the matching ratio be

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[20]Edward Gramlich, "The Effect of Federal Grants on State-Local Expenditures," pp. 575-577.

of any significance. But, as pointed out by Morss,[21] this is a rare occurrence since Federal administrators would change either the matching ratio or maximum allotments if grant monies went begging.

Another problem associated with studying the impact of grants-in-aid on state and local finances is that of simultaneity. In those studies using total expenditures as the dependent variable,[22] the aggregate expenditure (or revenue) data include the independent variable--grants. One method to remove this bias is to use expenditures, or revenues, from locally generated sources. However, as illustrated by Gramlich,[23] since grant monies are recorded as received after the checks are cleared, which is usually the same time the tax revenues are being received or expenditures made, it is substantially impossible to determine whether the grants are affecting spending levels or spending levels determing grants. In order to remove this bias, the grants variable is lagged one year. Since the denominator of the dependent variable is Personal Income, the per capita income variable is also lagged one year to remove any possible simultaneity problems. The data on liqudity are lagged one period for the same reason, and for a more theoretical reason. It is assumed that decisions on whether to raise or lower tax rates in the current period would be based on liquidity levels preceding the current period.

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[21]See Elliott R. Morss, "Tax Sharing: Good Reason for Its Adoption," National Tax Journal, 20 (Dec. 1967), p. 428.

[22]Gramlich, "The Effects of Federal Grants," pp. 584, 585.

[23]Ibid., p. 581.

In its complete form, the model to be tested using ordinary least squares regression technique is as follows:

$$FE_{it} = g\ (R_1, \ldots, R_8, Y_{it-1}, L_{it-1}, Nit-1, G_{it-1}, Z_1, \ldots, Z_8, T):$$

where: FE_{it} is fiscal effort of state i at time t
Y_{it-1} is per capita Personal Income of state i at time t-1
L_{it-1} is per capita liquidity of state i at time t-1
N_{it-1} is population of state i at time t-1
G_{it-1} is per capita grants received by state i at time t-1
T is time.

The variables R_1 through R_8 are dummy variables signifying the various regions, according to the definition of the Bureau of Economic Analysis,[24] with the exception of the Southeast, which for this paper is divided into two regions.[25] The variables $Z_1, \ldots, Z_8$ are a combination of the grants variable and the regional dummies; thus, Z_1, for the sake of argument in the New England region, is the product of the dummy

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[24]The regions as defined by the Bureau of Economic Analysis are: New England: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut; Mid-Atlantic: New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia; Southeast (defined below); Plains: Minnesota, Iowa, Missouri, Kansas, Nebraska, South Dakota and North Dakota; Southwest: Oklahoma, Taxes, New Mexico and Arizona; Rocky Mountain: Montana, Wyoming, Colorado, Utah and Idaho; Far West: Alaska, Hawaii, California, Oregon and Washington; See Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, August, 1978, p. 15.

[25]Due to the large number of states in this region and the differences in average income levels and degrees of urbanization that exist among them, this region was divided into two regions: South Atlantic (Florida, Georgia, North Carolina, South Carolina, Virginia, and West Virginia) and Other South (Alabama, Arkansas, Kentucky, Louisiana, and Mississippi).

variable R_1 and the grants variable. As dummy variables usually take on the values of either zero or one, as they do here, the value of Z_1 will take on the value of per capita grants of only the New England states; the other values are zero.[26] While the regional dummy variables R_1, ..., R_8 allow one to test whether there are sginificant differences in fiscal effort by region, the combined dummy variables Z_1, ..., Z_8 allow one to test whether the response to grants, as measured by the slope, differs by region.[27] Due to the fact that there are 51 political jurisdictions which are to be tested it becomes impossible to have a dummy variable for each state. The regional dummies are used as proxy variables for factors such as urbanization, indexes of industrialization, diversity, and other political and socioeconomic variables. Statistically significant differences in the regression coefficients of the dummy variables indicate differences in the relative preferences of public goods vis-a-vis private goods and, in this case, differences in response to grants, as measured by changes in fiscal effort.

The format of the model is a combination of cross-section and time series. This form allows the testing of whether individual units respond differently to the same grant structures (cross-section); since the decision to raise or lower tax rates cannot be made immediately (i.e., time must elapse from the moment the decision is reached until there are measurable results), it is necessary to test the model over a

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[26]For example, if we had five observations of a given variable, Xi, and multiplied that variable by a dummy variable D_1 = 1, 1, 1, 0, 0, the resulting variable would be X_1, X_2, X_3, 0, 0. See J. Johnston, Econometric Methods (New York: McGraw-Hill Book Co., 1963), p. 223.

[27]Ibid., p. 223.

period of years. Had just one year been chosen to test the model, the assumptions which one would be forced to make are that all units are in equilibrium and there are no time period specific terms influencing the results. If only a time-series model were used, the degree of aggregation would be too great to allow for the testing of whether regional responses to grants differ significantly from one another.[28] During the time period examined in this paper, 1960-1976, in addition to changes in matching ratios, eligibility provisions, and other administrative changes in the grants system, the aggregate composition of the system has changed significantly; there has been a shift toward social welfare grants and away from highway construction grants and, since 1973, the addition of General Revenue Sharing (see Table 5 below). In order to account for this change in the composition of the grant structure, the variable for grants is broken down into components: per capita social welfare grants and all other grants per capita. The impact of General Reveue Sharing is tested separately.

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[28]It is also generally assumed in a time series model that the structure of the system is constant over time. Any significant changes in the structure can cause the same micro units to have different responses at different times. See Edward Gramlich, "The Effect of Federal Grants," pp. 578-580.

Table 5

FEDERAL GRANTS TO STATE AND LOCAL GOVERNMENTS BY PURPOSE
Fiscal Years 1960 - 1976
(Amounts in Millions)

Fiscal year	All grants	General Revenue Sharing	Social welfare		Transportation		All other grants	
			Amount	Percent of total[a]	Amount	Percent of total	Amount	Percent of total
1960.....	$ 6,838	$ --	$ 3,610	52.8%	$ 2,999	43.9%	$ 229	3.3%
1961.....	6,921	--	3,950	57.1	2,687	38.8	284	4.1
1962.....	7,703	--	4,535	58.9	2,841	36.9	327	4.2
1963.....	8,324	--	4,825	58.0	3,074	36.9	425	5.1
1964.....	9,774	--	5,352	54.8	3,709	38.0	712	7.2
1965.....	10,630	--	5,669	53.3	4,088	38.5	873	8.2
1966.....	12,519	--	7,630	61.0	4,029	32.2	860	6.8
1967.....	14,820	--	9,845	66.4	4,086	27.6	889	6.0
1968.....	18,168	--	12,449	68.5	4,284	23.6	1,435	8.4
1969.....	19,765	--	13,802	69.8	4,265	21.6	1,698	7.6
1970.....	23,576	--	16,545	70.2	4,475	18.6	2,556	11.2
1971.....	27,691	--	19,544	70.6	4,720	17.0	3,426	12.4
1972.....	33,361	--	24,572	73.7	4,786	14.3	4,003	12.0
1973.....	40,986	6,636	24,446	59.6	4,961	12.1	4,943	12.1
1974.....	42,174	6,106	25,427	60.3	4,765	11.3	5,876	13.9
1975.....	48,510	6,130	30,216	62.3	4,995	10.3	7,169	14.8
1976.....	57,838	6,236	35,891	62.1	6,895	11.9	8,814	15.2

[a]When General Revenue Sharing grants are excluded, the proportion of total Federal grants categorized as Social Welfare are 71.2, 70.5, 71.3, and 69.6 percent in fiscal years 1973, 1974, 1975, and 1976, respectively.

Source: U.S. Department of Health, Education, and Welfare, Social Security Administration, Social Security Bulletin, October 1977, p. 23

CHAPTER V

RESULTS

In order to test the validity of the hypothesis that Federal grants-in-aid to state and local governments are relatively more stimulative of the recipients' fiscal effort in higher income areas than in lower ones, ordinary least squares regressions were fitted to the model presented in the previous chapter. For this hypothesis to be accepted, the net regression coefficients for the regional dummies for grants (the product of per capita grants and the regional dummies) would have to be significantly greater in the higher income regions (New England, Northeast, and Far West) than in the lower income regions. The results of the regressions presented in the subsequent sections are somewhat inconclusive--in general, it appears that, over time and across regions, the relationship between Federal grants and state and local government fiscal efforts is not statistically significant. The implications of this result are explored in greater detail in subsequent sections.

All Grants

Levels

The first tests of the model were run using total Federal grants-in-aid, on a per capita basis, as one of the explanatory variables. That is, the dollar amounts of each categorical grant (or block grant) were summed for each state and divided by the resident population of each

state, for each year from 1960 to 1976. In doing this, it is assumed that those responsible for budgetary decisions at the state and local level view the grant system as an undifferentiated whole rather than the variegated system that it is. While the aggregation of the various categorical grants greatly eases the burden of estimating the effect of grants on the recipients' fiscal effort, it does obscure the possibility that different grants may exert different influences in different states.

Initially, the regression equations were estimated using the data in their actual form, i.e., the dependent variables were both measures of fiscal effort, and the explanatory variables were: per capita Personal Income, population, per capita liquidity, and per capita grants, each lagged one year; the regional dummy variables, and time. From the results presented in Table 1 in the appendix to this chapter, this hypothesis appears to be validated. Differences in regional responses to Federal grants-in-aid, in terms of changes in the measures of fiscal effort, may be determined from the dummy variables representing the different regions; in this model, they are the regression coefficients and the "Z" variables. If these coefficients are significantly different from each other, then it may be said that their responses to Federal grants are different. When tax effort is used as the dependent variable, the coefficients for both the New England and Northeastern regional dummy variables, Z_1 and Z_2, are significantly different from zero, statistically, and positive; while the regional dummy variable for the Plains region, Z_5, is statistically significant and negative. Thus, all other things held constant, a $1.00 per capita increase in Federal grants to all states would cause an increase in tax effort of 0.0083 in the New England states; a 0.0035 percent increase in tax effort

in the Northeast, and a decrease in that ratio of 0.0045 percent in the Plains states. When revenue effort is used as the dependent variable (Table 1), none of the regional dummy variables for grants, the "Z" variables, are statistically significant. In other words, for all regions during this period, Federal grants-in-aid to state and local governments had no independent effect on the level of revenue effort.

Similar results were obtained when the data, except the regional dummy variables (the "R" variables) and time, were transformed into natural logarithms. As shown in Table 2 in the appendix, a one percent increase in per capita grants to all states would lead, after a one-year lag, to a 0.088 percent increase in tax effort in the New England states (Z_1) and a 0.071 percent increase in that ratio in the Northeastern states.[1] Since the regression coefficients are not significantly different from zero in other regions, it indicates that in these states the proportion of Personal Income which would be devoted to public uses through locally raised revenues would not change. In other words, state and local spending for various functions would, in the aggregate, rise by the amount of the grants, although the composition of that aggregate spending might change. Similarly, a one percent increase in per capita grants to all states would lead to a 0.06 percent increase in general revenue effort in New England and a 0.039 percent increase in the Northeast. The statistically insignificant regression coefficients for the other regions (Z_3 through Z_8) indicates that, for this period, per capita grants had no effect on revenue effort.

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[1]Transforming the data into natural logarithms allows the net regression coefficients to be interpreted as coefficients of elasticity. See Johnston, Econometric Methods, pp. 48, 49.

In order to eliminate the effects that extreme values may have on the regression results, Alaska and the District of Columbia were excluded. Their exclusion alters the results considerably. As presented in Table 3, the coefficients for the South Altantic region and the Rocky Mountain region, Z_3 and Z_7, respectively, are significantly different from zero and in both instances negative. A $1.00 increase in per capita Federal grants to all states leads to a 0.0076 reduction in the ratio of taxes per $100 of Personal Income in the South Atlantic region and a 0.0068 reduction in that ratio in the Rocky Mountain region. Using revenue effort as the dependent variable there would be a reduction in revenue effort of 0.0092 in the South Atlantic region. When the data are transformed into natural logarithms (see Table 4), the explanatory variables have the correct signs and are significantly different from zero.[2] A one percent increase in per capita Federal grants, ceteris paribus, would cause a 0.07 percent increase in tax effort in the Great Lakes region (GRNT) and a 0.0326 percent decrease in that ratio in the Far West (Z_8).

It is interesting to note that the coefficients for per capita Personal Income (INC) and per capita liquidity (LIQ) are both significant statistically, but their signs are the opposite of what is expected. The negative sign for the regression coefficient for per capita Personal Income indicates that as average incomes rise over time, ceteris paribus, state and local governments would tend to reduce the proportion of total

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[2]The higher degree of correlation found when the data were transformed into natural logarithms implies that there is a constant elasticity between the dependent variable and the independent variable rather than a linear relationship.

resources that would be devoted to public uses. Conversely, the positive sign of the regression coefficient indicates that as these same governments were confronted with increasing levels of liquidity, they would tend to raise taxes. These results do not appear to be reasonable. To a large extent these unexpected results are due to the form of the data used in the estimation of the regression coefficients. In the case of the positive sign for the regression coefficient for liquidity (LIQ), the result is due to the fact that both per capita liquidity and measures of fiscal effort are increasing over time. Thus, the strong time trend for both variables (fiscal effort and liquidity) produces a fairly strong simple correlation between them which results in statistically significant, positive regression coefficients. The negative net regression coefficient for per capita Personal Income (INC) is also caused by the fact that both fiscal effort and per capita Personal Income are increasing over time. From the regressions run using the data in this form, it was determined that the simple correlation coefficients between the measures of fiscal effort and per capita Personal Income are positive. It was also determined that these variables are correlated directly with the time variable (TIME). Using a simplified example, it may be shown that two variables which are positively correlated, and positively correlated with a third variable, could produce a neagtive partial correlation coefficient between the first two variables. For example, let us assume we have three variables, X_1, X_2, and X_3; with X_1 being the dependent variable. Let us further assume that the simple correlation coefficients are:

$r_{12} = 0.5$; $r_{13} = 0.6$; and $R_{23} = 0.9$.[3] The partial correlation coefficient,[4] $r_{12.3} = \dfrac{r_{12} - r_{13} \cdot r_{23}}{\sqrt{1 - r_{13}^2} \cdot \sqrt{1 - r_{23}^2}}$ or -0.11; the negative partial correlation coefficient obtained will produce a negative net regression coefficient between variables X_1 and X_2.

First Differences

Thus, while the results of these regressions are quite good in terms of multiple coefficients of determination, the estimates are somewhat unreliable due to the high degree of multicollinearity among the explanatory variables.[5] To avoid the multicollinearity problems generally associated with time-series data, the regressions were run with the variables transformed into first differences--both absolute first differences and percentage first differences. That is, changes in the measures of fiscal effort were regressed against changes in per capita Personal Income, per capita liquidity, population, and per capita grants; and percentage changes in fiscal effort were regressed against percentage changes in those variables. In mathematical notation, the model may be presented as:

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[3]These simple correlation coefficients correspond to the simple correlation coefficients between tax effort and per capita Personal Income (r_{12}), tax effort and TIME (r_{23}), and per capita Personal Income and TIME (r_{13}).

[4]Johnston, Econometric Methods, pp. 58-59.

[5]When many of the explanatory variables are highly correlated with one another, difficulties arise in determining the separate influences of each explanatory variable and obtaining any precise estimates of their relative effects. See J. Johnston, Econometric Methods, pp. 201-207.

$$(FE_{it} - FE_{it-1}) = h\,[R_j\,(Y_{it-1} - Y_{it-2}),\ (L_{it-1} - L_{it-2}),\ (N_{it-1} - (N_{it-2}),\ (G_{it-1} - G_{it-2}),\ Z_j]$$

or:

3.1 $$\Delta FE_{it} = h\,(R_j\ \ \Delta Y_{it-1},\ \Delta L_{it-1},\ \ \Delta N_{it-1},\ \ \Delta G_{it-1},\ Z_j)$$

where:
- FE_{it} is fiscal effort of state i at time t
- FE_{it-1} is fiscal effort of state i at time t-1
- Y_{it-1} is per capita Personal Income of state i at time t-1
- Y_{it-2} is per capita Personal Income of state i at time t-2
- L_{it-1} is per capita liquidity of state i at time t-1
- L_{it-2} is per capita liquidity of state i at time t-2
- N_{it-1} is resident population of state i at time t-1
- N_{it-2} is resident population of state i at time t-2
- G_{it-1} is per capita grants received by state i at time t-1
- G_{it-2} is per capita grants received by state i at time t-2
- R_j are regional dummies, j = 1 through 8
- $Z_j = R_j \cdot \Delta G_{it-1}$

Using first differences in percentage terms, the model becomes:

3.2 $$\frac{\Delta FE_{it}}{FE_{it-1}} = k\,(R_j,\ \frac{\Delta Y_{it-1}}{Y_{it-2}},\ \frac{\Delta L_{it-1}}{L_{it-2}},\ \frac{\Delta N_{it-1}}{N_{it-2}},\ \frac{\Delta G_{it-1}}{G_{it-2}},\ Z_j)$$

In this way, the upward secular trends in these variables were removed, eliminating to a great extent any multicollinearity among the independent variables. In general, this method did not yield the same results as far as "explaining" variances in fiscal effort over time among the states as did the prior regression anaylses (see Tables 1-4), but the results were more reliable. As mentioned earlier, in a pooled cross-section time-series regression, there is a possibility that time specific disturbances may arise. In order to test for the possibilty of these disturbances,

fifteen dummy variables, one for each period except the first, were added to the regression.[6] The regression coefficients of these dummy variables, if significantly different from zero, representing upward or downward shifts in the constant term, may be interpreted as legislative increases or decreases in tax rates which are unrelated to changes in the other explanatory variables. Thus, the impact of a one unit change (or one percent change) in any of the explanatory variables is the sum of the constant term, the coefficient of the time dummy, and the net regression coefficient. For any specific region, the regional dummy or dummies must also be added.[7] In order to accommodate these time dummies, it was necessary to eliminate or modify some of the other variables. The variables DNTH, DSTH, DMID, and DWST are $R_1 + R_2$, $R_3 + R_4$, $R_5 + R_6$, and $R_7 + R_8$, respectively; the variables NTH1, STH1, MID1, and WST1 are the products of the dummy variables multiplied by grants.

As presented in Table 5 in the appendix, a $1.00 per capita increase in Federal grants, ceteris paribus, in all states, leads to an increase in revenue effort, in the next period, of approximately 1.152 percentage points in the Western region only. In the period 1968-69, an increase of $1.00 per capita in Federal grants for all states, ceteris paribus, would lead to an increase in revenue effort, in the Western region only, of 2.672 percentage points in 1969-70 (the coefficient of T_9 is 1.520). In the other regions, the net impact of the $1.00 per capita increase in grants is effectively zero, as the net regression

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[6]This method yields unbiased and efficient estimates of ordinary least squares regression coefficients. See Jan Kmenta, Elements of Econometrics (New York: Macmillan Publishing Co., 1971) pp. 516-517.

[7]Ibid., p. 516.

coefficients are not significantly different from zero. When annual change in tax effort is used as the dependent variable, the net impact of changes in per capita grants is zero. That is, changes in per capita grants lagged one year exert no independent effect on changes in tax effort.

The transformation of the actual data into annual first differences in percentage terms yields similar results. An increase in Federal grants of one percent per capita for all states, ceteris paribus, leads to an increase in revenue effort of approximately 10.511 percent in the following period, in the Western region only (see Table 6). This result holds true in all periods except 1962-63, 1968-69, and 1970-71. In those periods, a one percent per capita increase in Federal grants to all states, ceteris paribus, results in changes in revenue effort, in the Western region only, of 16.735 percent, 21.336 percent, and 16.878 percent in 1963-64, 1969-70, and 1971-72, respectively. For the other regions, changes in the level of per capita grants exert no independent influence on changes in fiscal effort.

From the results of the regression analyses presented in Tables 5 and 6, it would appear that changes in Federal grants, on a per capita basis, are quite stimulative of revenue effort in the Western region. Thus, it would appear that the major hypothesis of this dissertaition has been validated, i.e., changes in Federal grants in high income regions (West) would be relatively more stimulative of fiscal effort in the following period than would changes in grants in other regions, with the usual caveat that all other things are held constant. Howver, a note of caution in this interpretation is inserted here. From Table 5, if all explanatory variables are held constant (the change in the level of these

variables is zero), revenue effort in the Western region would increase from one year to the next, at a constant rate of 1.201 percentage points, and tax effort would increase 0.137 percentage points per year.[8] In 1969-70, the increase in revenue effort in the West would be 2.721 percentage points; for all other regions, the increase in revenue effort would be 1.520 percentage points in that period. Since the net regression coefficient of the regional dummy for grants (WST) is negative, an increase of $1.00 per capita in Federal grants for all states, ceteris paribus, reduces the increase in revenue effort in the following period in the West by approximately 0.05 percentage points. That is, except for the 1969-70 period, a $1.00 per capita increase in Federal grants for all states, ceteris paribus, leads to an increase in revenue effort in the West of 1.152 percentage points, rather than 1.201 percentage points. A similar interpretation may be drawn when the data used are in terms of annual percentage changes (see Table 6). For the sake of brevity, only the sign of the net regression coefficients and their statistical significance will be discussed in subsequent sections.

Tables 7 and 8 contain the results of the regression analyses using the model as presented in 3.1 and 3.2, except that Alaska and the District of Columbia are excluded. As presented in these tables, the regression coefficients for grants and the regional dummies (NTH, STH, MID, and WST) are not significantly different from zero. Thus, when Alaska and the District of Columbia are excluded, no statistically sig-

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[8] In 1961-62 the change in tax effort would be -0.220 percentage points, 0.485 percentage points in 1963-64, -0.345 percentage points in 1966-67, -0.072 percentage points in 1967-68, -0.211 percentage points in 1972-73, -0.8711 percentage points in 1973-74, and -0.306 percentage points in 1974-75.

nificant relationships exist between changes in per capita Federal grants and changes in fiscal effort. It may be concluded, therefore, that changes in the level of per capita grants received by state and local governments exert no independent influence on the changes in fiscal effort during the period in question for the 49 states.

In the previous chapter it was hypothesized that secularly rising levels of per capita Personal Income would be a factor in explaining the rise in measures of fiscal effort. From the regression results obtained, it appears that, ceteris paribus, changes in the level of per capita Personal Income, by state, do not lead to increases in the level of fiscal effort. On the contrary, as presented in Tables 5 through 8, the relationship between changes in per capita Personal Income by state exert no influence on changes in the levels of fiscal effort; or these changes in the level of per capita Personal Income are negatively related to changes in the level of fiscal effort during the period studied. This result, however, is not due to multicollinearity among the explanatory variables; the simple correlation coefficients between the changes in the measure of fiscal effort and changes in per capita Personal Income are generally negative. Although the obtained results are not expected, they are not necessarily surprising. In general, during the period in question those states which experienced the most rapid increases in per capita Personal Income also had the slowest growth in the tax effort ratio.[9] However, since all states experienced positive average annual

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[9]The Spearman rank correlation coefficient between average annual percent change in tax effort for the period fiscal year 1960 through fiscal year 1978 and average annual percent change in per capita Personal Income for period calendar years 1959-1977 was -0.4667. Excluding Alaska and the District of Columbia, the rank corrleation coefficient was

changes in both tax effort and per capita Personal Income during this period, the interpretation of the regression results that increases in per capita Personal Income are a cause of reductions in fiscal effort should be regarded with reservation. That is, ceteris paribus, it should not be concluded from these results that increasing levels of per capita Personal Income lead to reductions in fiscal effort. A somewhat more plausible inference that may be drawn is that as per capita Personal Incomes increase, state and local revenue increase concurrently; if any unanticipated surpluses result, tax rates may be reduced somewhat in the following period. Conversely, falling levels of per capita Personal Income may cause short-falls of revenue which may lead to increased tax rates in subsequent periods.

In contrast to the results obtained when actual data were used (see Tables 1 through 4), the transformation of that data into annual first differences indicates that changes in the level of per capita liquidity, lagged one period, are inversely related to changes in the levels of fiscal effort in the current period. Therefore, a $1.00 per capita increase in liquidity in each state in period t-1 leads to a decline of 0.00043 in tax effort in each state in period t, and a decline in revenue effort of 0.00201 percentage points (see Table 5). When Alaska and the District of Columbia are excluded, a $1.00 per capita increase in liqudity in the 49 states in period t-1 corresponds to a decline of 0.00096 percentage points in tax effort in period t (see Table 7). As presented in Table 8, a one percent increase in per capita liquidity

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-0.5595. Both are significantly different from zero at the one percent level of confidence. See Sidney Siegel, Non-Parametric Statistics (New York: McGraw Hill Book Co., 1956), pp. 202-212, 248.

over the level of per capita liquidity in the previous period leads to a decline of 0.018 percent in tax effort in the subsequent period for the 49 states. Thus, the transformation of the data into annual first differences produces regression results with the correct sign for the liquidity variable.

The addition of two variables which were not in the original exposition of the model--the proportion of state and local government revenues provided by the Federal government (FED) and the proportion of state and local general revenues from their own sources raised by state governments (STAT)--does not alter the results significantly. These variables do have the correct sign and in some instances are statistically significant. Over time, the increasing role of the Federal government tends to reduce the willingness of the sub-national levels of government to raise revenues from their own sources; the positive coefficient of STAT indicates the converse. In those states where the state governments raise relatively greater proportions of the general revenue, there is a tendency for fiscal effort to increase faster than in those states where the local governments are relatively more dominant. This may be explained to some extent by the different mix of taxes used by the different levels of government. The state governments tend to rely more heavily on sales and income taxes which are generally considered fairly income elastic, while the reliance on property taxes which, are not considered very elastic in terms of income growth, for financing local governments would cause the local share of the state-local aggregate to fall. Another factor which may explain this is illustrated in footnote 11 to the previous chapter.

In order to test for the possibility of time specific disturbances that may occur in a pooled cross-section time-series model, a dummy variable for each year was incorporated into the model (these are the variables T_1, ..., T_{15}). Regression coefficients for these variables which are significantly different from zero imply a shift in the intercept, or constant terms. As presented in Tables 5 and 6, the coefficients of the time dummies are significantly less than zero, when annual change in tax effort is the dependent variable, for the periods 1961-62 (T_1), 1966-67 (T_6), 1967-68 (T_7), 1972-73 (T_{12}), 1973-74 (T_{13}), and 1974-75 (T_{14}). Only in the 1963-64 (T_3) period is there a positive shift in the constant term. When revenue effort is used as the dependent variable, the only regression coefficient which is significant is T_9 (1969-70). There is no reason, a priori, to expect this result, since the trend of state and local tax effort is generally upward; these negative coefficients would imply the converse. Only in the periods 1963-64 (T_3) and 1974-75 (T_{14}) are the signs of the coefficients the expected ones. In the first period, the strong economic expansion sharply increased the revenues of state and local governments, while the sharp economic contraction of 1974-75 severely reduced tax revenues. Excluding Alaska and the District of Columbia, the regressions for time dummies are generally positive (see Tables 7 and 8). By eliminating the extreme values from the regressions, the results are closer to what is expected, judging from the aggregate behavior of fiscal effort of state and local governments. The positive sign of the regression coefficients for the time dummies implies that there is an upward trend in the level of state and local fiscal effort. However, the existence of these positive regression coefficients indicates structural shifts in the annual changes in fiscal effort that are not

captured by the explanatory variables. This finding will be discussed in greater detail in subsequent sections.

Social Welfare Grants

It was hypothesized in earlier chapters that changes in grants for social welfare purposes would be relatively more stimulative of fiscal effort in higher income states than in lower income states. This hypothesis does not appear to be validated by the regression results. As presented in Table 9, a $1.00 per capita change in grants for social welfare purposes, for all states in any period, has no impact on changes in tax effort in the next period; a $1.00 per capita increase in all other grants, for all states in each period, leads to a decline in tax effort of 0.017 to 0.018 percentage points in the next period in the MID region only. A $1.00 per capita increase in social welfare grants to all states in each period leads to a reduction in revenue effort of 0.06 percentage points in the West in the following period. When the data are transformed to annual percentage changes, as opposed to annual absolute changes, similar results are obtained (see Table 10.) A one percent per capita increase in all other grants for all states in any period leads to a reduction in the tax effort ratio of approximately -.05 percent in the MID region only.

Excluding Alaska and the District of Columbia modifies the results of the regressions substantially. Increasing all other grants by $1.00 per capita in all states leads to a decline in fiscal effort ratios of approximately 0.015 percentage points in the following period in the South (see Table 11). A one percent per capita increase in all other grants for all states in each period leads to a reduction of the tax

effort ratio of 0.05 percent in the South and West regions and a reduction in the revenue effort in the West (see Table 12).

From the results obtained from the regression equations, it does not appear that grants for social welfare purposes are more stimulative of state and local fiscal effort in higher income regions than in lower ones. From the results presented in Table 10, the opposite inference may be drawn; in a high income region, the West, increases in social welfare grants tend to lead to reductions in fiscal effort. This does not necessarily mean that increases in social welfare grants in the West, ceteris paribus, lead to reductions in total expenditures for all purposes in that region. It does imply, however, that state and local taxes and other general revenues, as a proporton of Personal Income, would decline in that region. Excluding Alaska from these estimates indicates that for other states in the region, changes in the level of per capita grants for social welfare purposes do not lead to decreases in fiscal effort (see Tables 11 and 12). It is of interest to note though that the impact of changes in the levels of non-social welfare grants is approximately the same for the South and the West (when Alaska and the District of Columbia are excluded). That is, one percent per capita increases in non-social welfare grants for all states in each period lead to reductions, in the following period, of both tax effort and revenue effort (see Table 12). While it is expected that increases in grants would tend to reduce fiscal effort, ceteris paribus, in the low income region (in this case the South), the reduction in fiscal effort in the West is not expected.

By disaggregating Federal grants into two functional groupings--social welfare and non-social welfare--it was impossible to include here

any of the other explanatory variables which were included in the prior regression analyses (see Tables 5 through 8). The result of the exclusion of independent variables other than grants is to make the constant term for tax effort in Tables 9 and 10, and for revenue effort in Table 12, significantly greater than zero. This result implies that an upward trend exists in the level of tax effort in general,[10] which is not unexpected. In the prior regressions (Tables 5 through 8), the independent variables other than grants explained, in the statistical sense, enough of the variance in changes in tax effort, by state over time, to result in constant terms which are not significantly different from zero.

Revenue Sharing

Although the grant program known as General Revenue Sharing has been in existence only since 1972 when Congress passed the State and Local Fiscal Assistance Act of 1972, the idea that the Federal government should share some of its revenues with sub-national levels of government is a fairly old one.[11] The 1972 Act allocates a fixed sum to the various states by two formulas: the three-factor Senator formula and the five-factor House formula.[12] The larger allocation is

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[10]For example, if we have a relationship $Y_t = a + bX_t + C\ Time_t$ where Y_t is the level of the dependent variable at time t and X_t is the level of the independent variable at time t, then $Y_{t-1} = a + bX_t + C\ Time_{t-1}$. Then: $(Y_t - Y_{t-1}) = b(X_t - X_{t-1}) + C$. If C is significantly greater than zero, the dependent variable is correlated with time.

[11]In 1803 Congress allocated 5 percent of the proceed of sales of Federal lands for distribtuion to the states in which that land was located. Another plan to distribute "large" Federal surpluses was enacted in 1836. Prior to the 1960's, the last plea for some form of revenue sharing was in the 1880's; again, to redistribute Federal surpluses. See Richard P. Nathan, Allen D. Manvel, and Susannah E. Calkins and Associates, Monitoring Revenue Sharing (Washington, D.C.: Brookings Institution, 1975), pp. 344, 345.

[12]Ibid., p. 45.

granted to the state and the resulting totals are adjusted to conform to the overall aggregate allocated for that fiscal year. In contrast to most other Federal grants, the General Revenue Sharing grant requires no distinct "matching" funds from the recipient governments; thus, it may be treated as a pure lump-sum type of grant with no substitution effects.[13]

While there is no a priori reason to believe that General Revenue Sharing grants by themselves would depress the level of state and local fiscal effort, there are two reasons--the timing of the grant program and its structure--which could lead to that conclusion. First, the grant program was inaugurated in 1972, a time when state and local governments were considered to be under great fiscal stress, so that a grant program of this nature would be expected to lead to some tax reduction. Secondly, the Act of 1971 was for a five-year duration. This temporary nature of the program may have caused some jurisdictions to reduce taxes in the current period and increase their spending on capital projects which could be currently financed by debt and paid back later, i.e., future political leaders would be forced to bear the onus of in-

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[13]Since state and local tax effort is a factor in determining the statewide area share of the General Revenue Sharing fund being disbursed, there is a de facto matching ratio for these grants. According to Johnson, all states have a positive incentive to increase taxes in order to obtain a larger grant. See Marv Johnson, Occasional Paper, No. 19, a Discussion and Estimation of the Tax Effort Inducements of General Revenue Sharing, Metropolitan Studies Program, Maxwell School of Citizenship and Public Affairs, Syracuse University, May 1975, pp. 91, 92. However, these inducements must be tempered by the fact that two years or more will elapse from the time state taxes are increased until a discernible increase in General Revenue Sharing grants will be noticed. Since the total amount of the grants are fixed, inflation reduces the real value of the grants, thereby reducing the inducements to increase taxes in the current period.

creasing tax rates should the program be discontinued. Because of the uncertainty that the grant program would be extended indefinitely, it is possible that those responsible for budgetary decisions at the sub-national levels of government viewed the grant as a "windfall gain." That is, they could use the grant to reduce taxes to some extent and to increase expenditures on capital projects which were visible to the electorate. To some extent, the temporary nature of the grant program may be analagous to the effect that a transitory change in income would have on an individual earner. If an individual were to receive an unexpected increase in income, and this increase were considered to be only temporary, it would be expected that the individual would increase expenditures on consumer durables or increase savings.[14] In a similar manner, our budget maker could view this grant as a "windfall." Part of the grant could be used for savings (paying off past debts or added to cash balances) and part could be used for increasing the stock of durable goods. For example, these funds could be saved to purchase a new school building, the services of which are consumed over an extended period of time, rather than used to hire more teachers (or increase their salaries). Conversely, if the grant were deemed to be of a permanent nature, the budget makers might opt to increase expenditures, to some extent, for current consumption (e.g., more teachers, in addition to or in place of new school buildings). It is unlikely that if the grant were considered only temporary local governments would wish to initiate new programs or expand old ones which required high current expenditures and thus be saddled with increased levels of taxation should the program

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[14]See Milton Friedman, A Theory of the Consumption Function, (Princeton: Princeton University Press, 1957), pp. 25-30.

be discontinued. One study[15] estimated that for the first few entitlement periods a $1.00 Revenue Sharing grant would increase total state and local spending by only $0.43. While the degree of substitutiveness of this program seems quite high, the evidence suggests that General Revenue Sharing grants would not cause increases in state and local fiscal efforts.

From the data presented in Tables 13 and 14, the hypothesis that General Revenue Sharing grants would generally depress levels of state and local fiscal effort is not borne out. Only in the Plains region is the impact of General Revenue Sharing on fiscal effort negative. A $1.00 change in General Revenue Sharing grants reduces tax effort by slightly more than one percentage point and general revenue effort by slightly more than one-half of one percentage point in that region in the following period. In the other areas this grant program does not seem to have any impact on fiscal effort (see Table 13). Similarly, when the variables for the Federal share of total state and local revenues (FED) and the state share of total state and local revenues from own sources (STAT) and used, rather than changes in population and changes in liquidity, a $1.00 per capita increase in General Revenue Sharing grants reduces tax effort in the Plains region (Z_5) by nearly 1.06 percentage points and revenue effort by 0.57 percentage points (see Table 14). An increase of $1.00 per capita in all other grants leads to a reduction in revenue effort in the following period in New England (Z_1) of approximately 0.05 percentage points (see Tables 13 and 14), ceteris paribus. When the

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[15]Edward Gramlich, Harvey Galper, "State and Local Fiscal Behavior and Grant Policy," in Brookings Papers on Economic Activity, 1 (Washington, D.C.: Brookings Institution, 1973) p. 50.

variables are transformed into annual first percentage differences, General Revenue Sharing grants still affect fiscal effort in the Plains region in a negative manner (see Tables 15 and 16), but in a positive manner in the Far West region. A one percent per capita increase in General Revenue Sharing grants leads to a reduction in fiscal effort of approximately one percent in the Plains region, and in the Far West to an increase in tax effort of approximately two points and in revenue effort of approximately one percent.

To some extent, the positive sign of the regression coefficient of the regional dummy for General Revenue Sharing grants in the West (Z_8) is due to the presence of extreme values, in this case Alaska. When Alaska and the District of Columbia are exlcuded from the analysis, changes in General Revenue Sharing appear to have no significant impact on fiscal effort in the Far West (see Tables 17 and 18). However, these grants still exert a strong negative effect on fiscal effort in the Plains states. A $1.00 per capita change in General Revenue Sharing grants reduces tax effort by approximately 0.906 percentage points and revenue effort by approximately 0.373 percentage points in that region. A one percent per capita increase in these grants reduces tax effort by about 0.637 to about 0.779 percent (see Tables 19 and 20).

As stated previously, it appears that changes in General Revenue Sharing grants, ceteris paribus, do not lead to decreases in measures of fiscal effort in the following period in all regions. Only in the Plains region is the effect of changes in General Revenue Sharing grants, on a per capita basis, associated with the decreases in the measures of fiscal effort. In the other regions, there does not appear to be any significant relationship between changes in General Revenue Sharing grants, lagged

one period, and changes in fiscal effort. One inference that may be drawn is that increases in General Revenue Sharing grants, at least in the initial phase of this program, do not lead to increases in fiscal effort (except in extreme cases as shown in Tables 15 and 16). These results are not unexpected in light of the fact that this program was (and still is) of a temporary nature. Budget makers at the state and local level, in general, would not use these funds to reduce tax rates precipitously in the current period and then be forced to increase them later if the program were discontinued.

As hypothesized earlier, changes in per capita liquidity would lead to opposite changes in tax and revenue effort. That is, if liquidity were to increase, it is expected that fiscal effort would decrease in the following period. From the results presented in Tables 13, 15, 17, and 19, this hypothesis appears to be true; in almost all cases, the sign of the regression coefficient for liquidity is negative. An increase of one percent per capita in liquidity, ceteris paribus, leads to a decrease of tax effort of 0.064 percent in all states in the following period (see Table 15). When Alaska and the District of Columbia are excluded, an increase of per capita liquidity of one percent leads to a decrease in tax effort of 0.079 percent (see Table 19).

As opposed to the previous estimates, in the short (three-year) period in which General Revenue Sharing grants were studied, changes in per capita Personal Income exerted a significant positive influence on fiscal effort. This result is shown in Tables 13, 14, and 15. With the usual ceteris paribus caveat, a $1.00 per capita increase in per capita Personal Income for all states would lead to an increase in tax effort for all states of approximately 0.003 percentage points and an

increase in revenue effort of approximately 0.001 percentage points (see Tables 13 and 14). An increase in per capita Personal Income in all states leads to an increase in tax effort of approximately 0.431 percent for all states in the following period (see Table 15). As shown in Table 16, the regression coefficient for this variable is positive, but not statistically significant. Although it is expected that over time increases in per capita Personal Income and increases in fiscal effort should be positively correlated, the use of short-run first changes in the data implies that there should be a negative relationship between these variables. As mentioned earlier, an increase in per capita Personal Income would tend to increase tax revenues in the current period, which may portend decreases in tax rates in a subsequent period. When Alaska and the District of Columbia are excluded, the relationship between per capital Personal Income and fiscal effort is closer to what would be expected in the short-run. An increase in per capita Personal Income for all states, ceteris paribus, leads to a decline in revenue effort between 0.296 and 0.346 percent (see Tables 20, and 19, respectively). Using the data in absolute first differences, no significant relationship exists between changes in per capita Personal Income and fiscal effort (see Tables 17 and 18).

As expected, the sign of the regression coefficient for the Federal share of state and local revenues (FED) is generally negative, and the regression coefficient for the proportion of state and local revenues fron their own sources raised by the state government (STAT) have the correct sign (see Tables 14, 16, 18, and 20). That is, ceteris paribus, the greater the proportion of state and local revenues provided by the Federal government, the smaller the change in fiscal

effort over time; conversely, the larger the ratio of state raised revenues to the total of state and local revenues from their own sources, the greater the increase in fiscal effort.

Discussion of the Results

Judging from the regression results obtained in the previous sections of this chapter, it does not appear that changes in the level of Federal grants-in-aid, on a per capita basis, have any influence on changes in state and local government fiscal effort. That is, all other things remaining constant, state and local spending would rise (fall) by the exact amount of the increase (decrease) in Federal grants. This result implies that over the period studied, fiscal year 1960 through fiscal year 1976, the system of Federal grants to state and local governments was not a determining factor in the secular rise of the share of resources devoted to state and local governments, as measured by the ratios of tax effort and revenue effort. It is also of interest to note that, in general, the results of these regressions imply that over time recipient governments are not prone to replace their locally raised revenue with Federal grants.

This finding--that in the long-run, Federal grants to state and local governments exert no independent influence on state and local government fiscal effort--stands in stark contrast to the earlier studies, as described in the previous chapter, which found that grants either stimulated state and local spending or were substituted for state and local funds. However, these differences in results are not necessarily contradictory. In the short-run, an increase in Federal grants may lead to decreases in the tax or revenue effort if, for example, state and local governments have fairly substantial accumulated surpluses. An increase

in intergovernmental revenues may prompt budget makers at the sub-national levels of government to reduce tax rates, as this measure is usually politically popular. Conversely, if an increase in grants is due to the initiation of new types of programs, taxes at the state and local levels may be increased in order for the recipients to qualify for funds. Over time, however, these accumulated surpluses (except for employee retirement programs) are expected to be reduced through tax cuts (or increases in spending), so that the secular increase in fiscal effort is not necessarily due to secular increases in state and local government wealth (accumulated surpluses). Therefore, it is not expected that Federal grants would tend to depress levels of fiscal effort over time, since it is not expected that these accumulated surpluses will always be available to reduce tax rates. Conversely, over time, new grant programs become old grant programs. In their initial phase, state and local governments may have been impelled to raise taxes in order to qualify for these new grants. However, as the revenues from these grants become part of the budgets of state and local governments, small increases in older programs may not lead to increases in state and local tax rates. That is, increments in the size of older grant programs may lead to changes in the composition of state and local spending but not to increases in fiscal effort. In this study, no tests were made regarding the impact of Federal grants on the composition of state and local spending over time.

Although it may be concluded from the regression analyses presented in previous sections that increases in Federal grants to state and local governments exert no independent influence on changes in the level of fiscal effort of those governments, the model itself perfoms only

modestly in "explaining" the interstate variation in the changes in state and local fiscal effort over time. As presented in Tables 5 through 8, the coefficients of multiple determination (R^2) range from 0.1476 (see Table 5) to 0.2214 (see Table 8). Thus, the model used "explains", at best, only 22 percent of the interstate variation in fiscal effort during this period. However, due to the large number of observations, these coefficients of multiple determination are significantly different from zero. Another illustration of the relatively poor performance of the model in "explaining" these variances in fiscal effort over time is the statistical significance of the time dummies. A regression coefficient for any of these variables, which is significantly different from zero, implies a structural shift in the dependent variable which is not explained by the other explanatory variables. To some degree, these shifts may be explained by severe economic contractions which would tend to reduce tax revenues significantly, as would unforeseen large increases in surpluses. Conversely, unexpected increased economic activity could swell the receipts of state and local governments, which would result in a positive regression coefficient for the time variable. As presented in Tables 5 and 6, the coefficients of the time variable are significantly less than zero for T_1 (1961-62), T_6 (1966-67), T_7 (1967-68),[16] T_{13} (1973-74),[16] and T_{14} (1974-75). As the last two periods mentioned were marked by recession, the negative coefficients of the dummies were not unexpected. For the other periods, however, there were no recessions to explain the negative coefficients. For the period 1963-64, the positive coefficient of the time variable (see Tables 5 and 6) may

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[16] In Table 5 only.

be "explained" by sharp growth in real GNP in that year. When Alaska and the District of Columbia are excluded (see Tables 7 and 8), only the regression coefficient for T_{14} is significantly less than zero; the others, T_3, T_4, T_5, T_8, T_9, T_{10}, T_{11}, and T_{12}, are significantly greater than zero. While these results are the opposite of those obtained when all states were included, the differences may be explained by the fact that the latter results exclude extreme values. However, the existence of these significant results implies that there is a possibility that one or more independent variables exist that may "explain," to a greater degree, interstate variation in state and local fiscal effort over time.

One possibilty lies with the form of the grants variable used, i.e., total per capita grants. It may be that the system of grant programs is too complex and varied to be lumped into a single variable to explain changes in fiscal effort. However, segregating the grants system into social welfare grants and non-social welfare grants did not significantly alter the degree of explanatory power of the model (see Tables 9-12). An alternative division of the grant system as advanced by Thurow,[17] is grants for capital construction or capital purchase purposes, and grants for current expenditures. If state and local governments are more willing to finance capital expenditures by increasing their debt, then an increase in grants for these purposes may not have an impact on fiscal effort. For example, an increase in Federal grants for the purpose of constructing new school buildings may lead to an increase in expenditures for school construction on the part of state

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[17]Lester Thurow, "The Theory of Grants-in-Aid," National Tax Journal, 19 (December 1966), pp. 373-377.

and local governments, but these expenditures may be more readily financed by bond issues than increases in taxes. Conversely, an increase in grants for educational purposes, such as bilingual education or other programs, may lead to a similar increase in spending on the part of the recipients, but these increases in spending would be financed by tax increases. Thus, ceteris paribus, an equal change in two grant programs--one for capital purchases and one for current expenditures--may have different effects on the changes in fiscal effort.

As mentioned in previous chapters, it is expected that diversity (however defined) would have an impact on state and local expenditures. That is, ceteris paribus, the more diverse (as far as income distribution, ethnicity, urban-rural divisions) an area was, the greater the probability that increases in Federal grants would be more stimulative of fiscal effort than the same increases in Federal grants in a more homogeneous area. However, there does not appear to be a single variable that could capture the "diversity" within a given state in each year. Since the data in this study included all, or almost all, of the states, there exists enough diversity among the states to capture the effect of this variable on fiscal effort. Yet, the regional coefficients which should have reflected the interstate diversity did not yield significant results, as measured by their regression coefficients. Another possibility which may improve the performance of the model is a change in the measure of income used from per capita Personal Income to median family income. As illustrated by Oates,[18] in most public choice models, it is the median voter who determines the level of local expenditures;

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[18]Wallace Oates, Fiscal Federalism, p. 100.

and for most purposes the median income person or family would better represent the median voter than would a per person statistic such as per capita Personal Income. However, for fiscal 1976, median family income performed only marginally better than did Personal Income in explaining interstate variations in fiscal effort.[19] Should the use of these or any other variables significantly improve the relationship between the dependent variable and the explanatory variables, this would reduce the burden borne by the regional dummy variables as "catch-all" variables. The regression coefficients of the dummy variables would then come closer to explaining actual regional responses to grants.[20]

Before concluding this chapter, a brief note on the relative explanatory power of the model when only General Revenue Sharing grants are studied (Tables 13-20), as compared to the previous regression sums (Tables 5-12). Although regressions for the General Revenue Sharing portion performed better, in terms of coefficients of multiple determination (R^2), than did the regressions for all grants (Tables 5-8), and for social welfare and non-social welfare grants (Tables 9-12), the relative explanatory power of the regressions for Revenue Sharing is not necessarily

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[19]The correlation coefficient between median family money income in 1975 and 1976 tax effort is .5863, and .4865 for revenue effort. The correlation between per capita Personal Income and those two measures of fiscal effort are .5496 and .4594 respectively. Department of Commerce, Bureau of the Census, Govenrmental Finances in 1975-76, p. 68. Survey of Current Business, April 1979, p. 20 and Bureau of the Census, Current Population Reports, Series P-20, No. 334. Demographic, Social and Economic Profile of the States, Spring 1976, Jan., 1979, pp. 38, 39.

[20]Another possibility is that different regional coefigurations could have produced better results. That is, rather than Bureau of Economic Analysis regional configurations, the ones used by the Census Bureau may be better suited as explanatory variables. Perhaps dummy variables based on income levels, degree of urbanization, or some other category would yield better results than the regional dummies.

better than the other regressions. This somewhat contradictory finding may be explained when the "F" ratios are examined. The "F" ratio is defined as $(R^2/1-R^2) \cdot (n-k)/(k-1)$, where R^2 is the coefficient of multiple determination, or "explained" variance, and $1-R^2$ is the "unexplained" variance. The term n-h is the number of observations (n) less the number of independent variables (k). Thus, although the model using Revenue Sharing grants and all other grants may explain up to 75 percent of the variation of changes in fiscal effort for the period 1973-76 (see Table 15), the "F" ratios obtained in Tables 13 through 20 are somewhat lower than those found in Tables 5 through 12. This implies that, when adjusted by the degree of freedom in the regressions, the latter regressions (Tables 13-20) do not explain, to a greater degree, the interstate variance in changes in fiscal effort in the earlier regressions (Tables 5-12).

APPENDIX TO CHAPTER 5

Table 1

REGRESSION COEFFICIENTS AND "T" VALUES
ALL GRANTS - LEVELS
All States

Variable	Tax effort		Revenue effort	
	Regression coefficient	t Value	Regression coefficient	t Value
Constant	8.677	31.762*	11.52000	18.110*
R_1	.60795	1.892	-.42861	-.573
R_2	.107844	.288	-.05610	-.089
R_3	.13311	.446	-.39955	-.575
R_4	.60003	2.058*	.55023	.810
R_5	1.59480	5.234*	1.69280	2.385*
R_6	.95128	2.483*	1.54690	1.734
R_7	1.87860	5.950*	1.50300	2.044**
R_8	1.77210	5.850*	2.85050	4.040**
INC	-.00033	-3.539*	-.00063	-2.900*
POP	.00007	5.671*	-.00002	-.622
LIQ	.00096	3.639*	.00303	4.949*
GRNT	-.00085	-.476	-.00046	-.110
Z_1	.00833	3.135*	.00739	1.194
Z_2	.00347	1.711**	.00130	.275
Z_3	-.00052	-.233	-.00190	-.369
Z_4	-.00311	-1.605	-.00298	-.659
Z_5	-.00450	-1.983*	-.00722	-1.366
Z_6	-.00252	-.908	-.00598	-.926
Z_7	.00062	-.298	.00093	.194
Z_8	-.00257	-1.181	-.00029	-.058
TIME	.27699	11.302*	.43610	7.639*
R^2	.4705		.3283	
Standard error	1.307		3.044	
F ratio	25.752*		19.654*	

*Significant at 5%
**Significant at 10%

Table 2

REGRESSION COEFFICIENTS AND "T" VALUES
ALL GRANTS - LOGS
All States

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	3.16600	12.410*	3.61900	13.175*
R_1	-.26172	-2.492*	-.25926	-2.293*
R_2	-.25053	-2.895**	-.15943	-1.711
R_3	-.14722	-1.556	.07143	-.702
R_4	.14339	1.381	.10667	.955
R_5	.19514	1.989**	.19386	1.835**
R_6	.04477	.339	.14620	1.029
R_7	.19854	1.657	.05902	.458
R_8	.29212	2.888*	.10230	.940
INC	-.15076	-4.874*	-.16705	-5.017*
POP	.01079	2.204*	-.02664	-5.053*
LIQ	.03466	5.533*	.06159	9.135*
GRNT	-.02616	-1.510	-.00708	-.380
Z_1	.08800	3.691*	.06064	2.363*
Z_2	.07103	3.603*	.03922	1.848**
Z_3	.02970	1.423	.00568	.253
Z_4	-.03250	-1.548	-.02304	-.960
Z_5	-.02603	-1.194	-.03505	-1.493
Z_6	.00016	.006	-.02180	-.711
Z_7	-.01007	-.394	.00436	.158
Z_8	-.03366	-1.523	.00780	.328
TIME	.02781	10.023*	.03037	10.168*
R^2	.5036		.6017	
Standard error	.1145		.01518	
F ratio	40.829*		60.798*	

*Significant at 5%
**Significant at 10%

Table 3

REGRESSION COEFFICIENTS AND "T" VALUES
ALL GRANTS - LEVELS
Excludes Alaska and the District of Columbia

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	6.01700	16.166*	7.63600	16.679*
R_1	.89024	1.786	1.35070	2.203*
R_2	.67317	1.345	.55892	.908
R_3	1.16150	2.330*	1.49440	2.437*
R_4	-.12685	-.265	-.33602	-.570
R_5	-.42219	-.973	-.44262	-.830
R_6	.48227	1.060	1.04750	1.872**
R_7	1.01120	2.009*	.98296	1.588
R_8	-.19424	-.372	-.14201	-.221
INC	.00096	8.283*	.00075	5.297*
POP	.00001	.649	-.00001	-.613
LIQ	.00323	5.178*	.00795	10.373*
GRNT	-.00239	-1.166	-.00220	-.872
Z_1	-.00227	-.625	-.00301	-.674
Z_2	-.00137	-.399	-.00041	-.047
Z_3	-.00755	-1.901**	-.00922	-1.877**
Z_4	.00385	.971	.00497	1.017
Z_5	.00309	1.054	.00293	.815
Z_6	-.00145	-.589	-.00909	-.300
Z_7	.00680	-1.837**	-.00684	-1.503
Z_8	.00252	.598	.00106	.204
TIME	.06670	1.864**	.16272	3.687*
R^2	.4676		.5386	
Standard error	2.017		2.480	
F ratio	33.912*		45.075*	

*Significant at 5%
**Significant at 10%

Table 4

REGRESSION COEFFICIENTS AND "T" VALUES
ALL GRANTS - LOGS
Excludes Alaska and the District of Columbia

Variable	Tax effort		Revenue effort	
	Regression coefficient	t Value	Regression coefficient	t Value
Constant	.04093	.771	.04098	.785
R_1	.01325	.180	.01338	.185
R_2	.00764	.104	.00737	.101
R_3	.02377	.305	.03792	.494
R_4	-.05575	-.795	-.05177	-.750
R_5	.05994	-.915	-.03581	-.555
R_6	.08464	1.050	.11790	1.485
R_7	.03951	.508	.02430	.317
R_8	-.12077	-1.551	-.10021	-1.308
INC	.24753	23.589*	.22758	22.037*
POP	-.01782	-3.497*	-.02510	-5.005*
LIQ	-.04218	4.670*	-.10195	-11.471*
GRNT	.07006	4.011*	.10530	6.126*
Z_1	.01333	.815	.01414	.879
Z_2	.00907	.554	.00840	.521
Z_3	.00241	.138	.00075	.043
Z_4	.02247	1.404	.02046	1.299
Z_5	.01779	1.204	.01275	.877
Z_6	-.01652	-.926	-.01283	-.730
Z_7	-.00290	-.167	-.00085	-.049
Z_8	.03264	1.856**	.02444	1.412
TIME	-.01030	-6.630*	-.01310	-8.567*
R^2	.9394		.9516	
Standard error	.1235		.1215	
F ratio	598.182*		759.264*	

*Significant at 5%
**Significant at 10%

Table 5

REGRESSION COEFFICIENTS AND "T" VALUES - ALL GRANTS
ABSOLUTE DIFFERENCES
All States

Dependent variable:	Tax effort		Revenue effort	
Independent variable	Regression coefficient	t value	Regression coefficeient	t value
Constant	.09326	.633	.38360	.452
DNTH	.10419	1.355	.14551	.322
DSTH	-.04126	-.492	.12151	.250
DMID	.00302	.036	.21259	.441
DWST	.13672	1.739**	1.20110	2.634*
INCM	-.00054	-3.325*	.00004	.046
POP	-.00002	-.062	-.00164	-.896
LIQ	-.00043	-2.142*	-.00201	-1.710**
FED	-.00430	-.960	-.08910	-3.429*
STAT	.00335	1.529	.02129	1.678**
GRNT	.00091	.380	-.00278	-.200
NTH	-.00029	-.114	.00548	.373
STH	-.00069	-.247	.00249	.154
MID	-.00072	-.228	.00306	.166
WST	-.00213	-.831	-.04950	-3.327*
T_1	-.35713	-.3050*	-.28580	-.421
T_2	-.04801	-.412	.16981	.251
T_3	.34795	2.968*	.73211	1.077
T_4	-.11326	-.950	.41320	.598
T_5	-.14669	-1.223	.34898	.502
T_6	-.47173	-3.957*	.00757	.011
T_7	-.20855	-1.711**	.15199	.215
T_8	-.09617	-.777	.26880	.374
T_9	.07442	.611	1.52000	2.153*
T_{10}	-.06869	-.572	-.75806	-1.089
T_{11}	.05989	.456	1.02160	1.341
T_{12}	-.34750	-2.372*	.63005	.741
T_{13}	-1.00730	-7.370*	-.04852	-.061
T_{14}	-.44309	-3.267*	.52565	.668
T_{15}	-.17008	-1.209	.07491	.091
R^2	.2128		.1476	
Standard error	.5879		3.409	
F ratio	7.325*		4.693*	

*Significant at 5% level of significance
**Significant at 10% level of significance

Table 6

REGRESSION COEFFICIENTS AND "T" VALUES - ALL GRANTS
PERCENTAGE DIFFERENCES
All States

Dependent variable:	Tax effort		Revenue effort	
Independent variable	Regression coefficient	t value	Regression coefficeient	t value
Constant	1.71000	1.355	-1.03400	-.262
DNTH	.76777	1.097	1.05410	.481
DSTH	-.49351	-.660	.35247	.150
DMID	-.03960	.042	1.48790	.648
DWST	1.09060	1.480	11.06100	4.791*
INCM	-.12877	-2.255*	-.13634	-.762
POP	.06142	.420	.19681	.431
LIQ	.00030	-.429	.00069	.314
FED	-.03058	-.802	-.50065	-4.193*
STAT	.03422	.390	.16963	2.774*
GRNT	.00754	.481	-.00457	-.093
NTH	.00770	.390	.03795	.614
STH	-.00593	-.263	.00126	.018
MID	-.01104	-.429	.00289	.036
WST	-.03030	-1.179	-.55104	-6.836*
T_1	-2.76040	-2.643*	-1.21180	-.370
T_2	-.57335	-.588	1.75080	.544
T_3	3.94080	3.791*	6.22440	1.911*
T_4	-.34802	-.332	3.39710	1.003
T_5	-.39113	-.359	3.19370	.937
T_6	-3.92120	-3.682*	-.25448	-.076
T_7	-.82541	-.754	2.05830	.600
T_8	.34640	.311	2.32970	.667
T_9	1.62820	1.521	10.82500	3.229*
T_{10}	-.47885	-.455	1.77510	.539
T_{11}	2.14280	1.893**	6.36720	1.796**
T_{12}	-.58790	-.485	3.54600	.934
T_{13}	-6.80540	-6.089*	-.85309	-.244
T_{14}	-2.12630	-1.927**	1.95140	1.564
T_{15}	.39420	.356	1.88960	.539
R^2	.2085		.1528	
Standard error	5.164		16.17	
F ratio	7.141*		4.887*	

*Significant at 5% level of significance
**Significant at 10% level of significance

Table 7

REGRESSION COEFFICIENTS AND "T" VALUES - ALL GRANTS
ABSOLUTE DIFFERENCES
Excludes Alaska and the District of Columbia

Dependent variable:	Tax effort		Revenue effort	
Independent variable	Regression coefficient	t value	Regression coefficeient	t value
Constant	.14270	.1374	.16690	1.415
DNTH	-.05867	-.483	-.06611	-.751
DSTH	-.05441	-.681	-.05989	-.684
DMID	-.03871	-.478	-.03315	-.372
DWST	-.02684	-.324	-.00823	-.089
INCM	-.000003	-.108	-.00013	-.644
POP	.00007	.254	.000006	.020
LIQ	-.00096	-1.772**	-.00036	-.560
FED	-.00508	-1.141	-.00498	-.935
STAT	.00154	.864	.00240	1.128
GRNT	.00148	.538	.00120	.520
NTH	-.00155	-.478	.00006	.018
STH	-.00420	-1.385	-.00370	-1.348
MID	-.00213	-.700	-.00229	-.770
WST	-.00372	-1.039	-.00397	-1.103
T_1	.05864	.494	1.26760	.892
T_2	-.13163	1.094	-.16574	-1.150
T_3	.33938	2.830*	.47057	3.277*
T_4	.42362	3.467*	.52783	3.068*
T_5	.13385	1.073	.22011	1.472
T_6	-.02528	-.201	.01930	.128
T_7	-.15852	-1.258	-.10971	-.727
T_8	.16977	1.313	.24777	1.601**
T_9	.23519	1.803**	.29584	1.891**
T_{10}	.33916	2.652*	.41650	2.721*
T_{11}	.30047	2.274*	.31581	1.998*
T_{12}	.32231	2.184*	.36454	2.067*
T_{13}	-.08801	-.560	-.07253	-.386
T_{14}	-.42054	-2.807	-.43559	-2.421*
T_{15}	-.03331	-.225	.06029	.341
R^2	.1992		.1684	
Standard error	.5112		.6119	
F ratio	6.467*		5.265*	

*Significant at 5% level of significance
**Significant at 10% level of significance

Table 8

REGRESSION COEFFICIENTS AND "T" VALUES - ALL GRANTS
PERCENTAGE DIFFERENCES
Excludes Alaska and the District of Columbia

Dependent variable:	Tax effort		Revenue effort	
Independent variable	Regression coefficient	t value	Regression coefficeient	t value
Constant	1.89600	2.127*	1.74100	2.133*
DNTH	-.52390	-.782	-.51412	-.839
DSTH	-.69780	-1.011	-.71314	-1.129
DMID	-.67261	-.985	-.45483	-.727
DWST	-.43150	-.612	-.26463	-.410
INCM	-.18274	-3.616*	-.20464	-4.424*
POP	-.18897	-1.468	-.15301	-1.299
LIQ	-.01286	-2.146*	-.01087	-1.396
FED	-.06339	-1.680**	-.04993	-1.445
STAT	.03229	2.032*	.03360	2.310*
GRNT	.01921	1.027	.01861	1.087
NTH	-.01286	-.567	-.00811	-.390
STH	-.03723	-1.514	-.01577	-.701
MID	-.02420	-1.028	-.02613	-1.213
WST	-.03944	-1.373	-.03762	-1.430
T_1	.95889	.929	1.32580	1.404
T_2	-.59611	-.569	-.46811	-.488
T_3	3.60260	3.464*	3.95890	4.159*
T_4	4.71980	4.462*	4.64500	4.799*
T_5	1.86870	1.712**	2.19470	2.197*
T_6	.34782	.319	.71225	.713
T_7	-1.05740	-.974	-.46103	-.464
T_8	2.14920	1.936*	2.24530	2.210*
T_9	2.78240	2.472*	2.57050	2.495*
T_{10}	3.18880	2.933*	3.12530	3.145*
T_{11}	2.73460	2.470*	2.18040	2.152*
T_{12}	3.88480	3.300*	3.54290	3.288*
T_{13}	.33036	.274	.54587	.494
T_{14}	-3.17260	-2.748*	-2.25520	-2.134*
T_{15}	.16733	.146	.73697	.704
R^2	.2214		.2131	
Standard error	4.486		4.106	
F ratio	7.392*		7.043*	

*Significant at 5% level of significance
**Significant at 10% level of significance

Table 9

REGRESSION COEFFICIENTS AND "T" VALUES - SOCIAL WELFARE GRANTS AND ALL OTHER GRANTS - ABSOLUTE DIFFERENCES
All States

Dependent variable:	Tax effort		Revenue effort	
Independent variable	Regression coefficient	t value	Regression coefficeient	t value
Constant	.22110	2.169*	.26860	.447
DNTH	.10240	1.308	.04301	.093
DSTH	-.04132	-.527	-.04524	-.098
DMID	.02662	.323	-.03527	-.073
DWST	.09450	1.232	.44978	.995
AOG	.00094	.143	-.00825	-.213
NTH1	-.00202	-.303	.00834	.212
STH1	.00409	.598	.01132	.281
MID1	-.01740	-2.435*	-.00957	-.227
WST1	.00264	.399	-.00946	-.243
SWG	.00096	.402	-.00219	-.156
NTH2	.00129	.481	.00550	.349
STH2	-.00165	-.590	.00035	.021
MID2	.00248	.771	.00909	.480
WST2	-.00336	-1.306	-.05919	-3.905*
T_1	-.30819	-2.677*	-.30882	-.455
T_2	-.04002	-.348	.06312	.093
T_3	.37897	3.293*	.50114	.739
T_4	-.03645	-.315	.13287	.195
T_5	-.05935	-.514	.04152	.061
T_6	-.42037	-3.648*	-.27325	-.403
T_7	-.08798	-.764	.01704	.025
T_8	.03216	.277	.12917	.189
T_9	.18201	1.579	1.39910	2.060*
T_{10}	.01327	.114	-1.02220	-1.497
T_{11}	.24656	2.108*	.73741	1.070
T_{12}	-.12644	-1.086	-.00328	-.005
T_{13}	-.76414	-5.620*	-.66995	-.836
T_{14}	-.25796	-2.241*	.01961	.029
T_{15}	.06228	.532	-.46468	-.674
R^2	.2335		.1437	
Standard error	.5801		3.4170	
F ratio	8.257*		4.547*	

*Significant at 5% level of significance
**Significant at 10% level of significance

Table 10

REGRESSION COEFFICIENTS AND "T" VALUES - SOCIAL WELFARE GRANTS AND ALL OTHER GRANTS - PERCENTAGE DIFFERENCES
All States

Dependent variable:	Tax effort		Revenue effort	
Independent variable	Regression coefficient	t value	Regression coefficeient	t value
Constant	2.86600	3.100*	2.53400	.826
DNTH	1.08800	1.500	.53233	.221
DSTH	-.38994	-.554	-.63617	-.272
DMID	-.09000	-.119	-.42699	-.170
DWST	.81173	1.143	4.02510	4.707**
AOG	.00590	.368	.00783	.147
NTH1	-.01241	-.684	.00356	.059
STH1	.00253	.129	.00642	.099
MID1	-.04962	-2.347*	-.04068	-.580
WST1	-.00112	-.050	-.08744	-1.176
SWG	.00253	.233	.00290	.081
NTH2	.00228	.187	.00008	.002
STH2	-.00089	-.078	-.00541	-.143
MID2	.02092	1.461	.02216	.466
WST2	-.00550	-.485	-.03959	-1.053
T_1	-3.22370	-3.134*	-2.24920	-.659
T_2	-.80296	-.785	.03803	.011
T_3	3.61920	3.542*	3.87020	1.141
T_4	-.94667	-.920	-.16199	-.047
T_5	-1.11490	-1.088	-.37297	-.110
T_6	-4.70060	-4.582*	-3.45440	-1.015
T_7	-1.66930	-1.636	-1.19230	-.352
T_8	-.51123	-.493	-.60891	-.177
T_9	.98015	.960	9.88450	2.918*
T_{10}	-.65233	-.635	-.73059	-.214
T_{11}	1.21120	1.186	1.42210	.419
T_{12}	-2.07860	-2.035*	-1.92870	-.569
T_{13}	-7.03880	-6.048*	-6.01800	-1.558
T_{14}	-2.99110	-2.927*	-2.37690	-.701
T_{15}	-.40221	-.389	-1.37420	-.401
R^2	.2187		.0614	
Standard error	5.130		17.020	
F ratio	7.587*		1.772	

*Significant at 5% level of significance
**Significant at 10% level of significance

Table 11

REGRESSION COEFFICIENTS AND "T" VALUES - SOCIAL WELFARE GRANTS AND ALL OTHER GRANTS - ABSOLUTE DIFFERENCES
Excludes Alaska and the District of Columbia

Dependent variable:	Tax effort		Revenue effort	
Independent variable	Regression coefficient	t value	Regression coefficeient	t value
Constant	.13150	1.398	.13880	1.207
DNTH	-.02195	-.277	-.01275	-.135
DSTH	-.02754	-.352	.00652	.070
DMID	-.02218	-.278	.03285	.344
DWST	-.02958	-.365	.01361	.140
AOG	-.00050	-.110	-.00115	-.212
NTH1	-.00717	-1.287	-.00712	-1.068
STH1	-.01481	-2.821*	-.01540	-2.454*
MID1	-.00493	-.889	-.00692	-1.043
WST1	-.00791	-1.459	-.00850	-1.310
SWG	-.00113	.373	.00342	.947
NTH2	-.00059	-.168	-.00152	-.360
STH2	-.00320	-.977	-.00509	-1.352
MID2	-.00186	-.560	-.00430	-1.081
WST2	-.00064	-.156	-.00275	-.563
T_1	.04673	.459	.13461	1.107
T_2	-.14605	-1.435	-.16779	-1.379
T_3	.33443	3.285*	.49112	4.035*
T_4	.42727	4.194*	.55269	4.538*
T_5	.15220	1.484	.25415	2.079*
T_6	-.03915	-.383	.02775	.227
T_7	-.21274	-2.083*	-.15733	-1.288
T_8	.15656	1.533	.23739	1.945*
T_9	.22513	2.174*	.27525	2.223*
T_{10}	.32693	3.205*	.41777	3.425*
T_{11}	.30290	2.882*	.33737	2.684*
T_{12}	.30585	2.863*	.34348	2.689*
T_{13}	-.06206	-.575	-.02003	-.155
T_{14}	-.32837	-2.853*	-.24728	-1.797*
T_{15}	-.11052	-1.081	.01330	.106
R^2	.2236		.1956	
Standard error	.5034		.6018	
F ratio	7.490*		6.321*	

*Significant at 5% level of significance
**Significant at 10% level of significance

Table 12

REGRESSION COEFFICIENTS AND "T" VALUES - SOCIAL WELFARE GRANTS AND ALL OTHER GRANTS - PERCENTAGE DIFFERENCES
Excludes Alaska and the District of Columbia

Dependent variable:	Tax effort		Revenue effort	
Independent variable	Regression coefficient	t value	Regression coefficeient	t value
Constant	1.34600	1.569	1.58200	2.088*
DNTH	.09414	.132	-.22555	-.369
DSTH	-.06687	-.096	-.37494	-.637
DMID	.01093	.015	-.06738	-.111
DWST	.06192	.086	-.05933	-.096
AOG	.01326	.865	.00721	.521
NTH1	-.02452	-1.308	-.01646	-.965
STH1	-.05434	-2.914*	-.02889	-1.708**
MID1	-.03003	-1.589	-.02453	-1.426
WST1	-.05111	-2.513*	-.04230	-2.281*
SWG	.01103	.993	.00116	.441
NTH2	-.01005	-.891	.00309	.332
STH2	-.00944	-.821	-.00762	-.630
MID2	-.01924	-1.484	-.00824	-1.201
WST2	-.01410	-1.058	-.01524	-.710
T_1	.75482	.832	1.37540	1.643**
T_2	-1.37130	-1.508	-1.08400	-1.292
T_3	3.39710	3.739*	3.95940	4.724*
T_4	4.22950	4.649*	4.31620	5.144*
T_5	1.14050	1.218	1.57250	1.865**
T_6	-.75533	-.831	-.14395	-.172
T_7	-2.12000	-2.325*	-1.27840	-1.521
T_8	1.08690	1.194	1.38190	1.646**
T_9	1.96090	2.110*	1.95340	2.291*
T_{10}	2.56250	2.822*	2.66550	3.182*
T_{11}	2.07910	2.258*	1.75120	2.062*
T_{12}	2.18930	2.373*	2.09570	2.465*
T_{13}	-1.12581	-1.352	-.86591	-1.010
T_{14}	-3.65080	-3.768*	-2.55010	-2.855*
T_{15}	-.13110	-1.245	.32356	-.386
R^2	.2208		.1993	
Standard error	4.487		4.139	
F ratio	7.370*		6.712*	

*Significant at 5% level of significance
**Significant at 10% level of significance

Table 13

REGRESSION COEFFICIENTS AND "T" VALUES
REVENUE SHARING AND ALL OTHER GRANTS
FIRST DIFFERENCES - ABSOLUTE
All States

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	-.87890	-.722	-.18710	-.329
R_1	.70672	.512	.69078	1.069
R_2	-.25657	-.197	-.14119	-.232
R_3	-.05100	-.0309	.09355	.152
R_4	.01630	.012	-.02911	-.047
R_5	.08948	.066	.49058	.768
R_6	.05917	.036	.44079	.581
R_7	.33451	.221	.22431	.316
R_8	.42144	.277	.84450	1.187
INC	.00295	3.210*	.00116	2.710*
POP	-.00667	-.246	-.00167	-1.332
LIQ	-.00090	-.633	-.00108	-1.638
FED	--	--	--	--
STAT	--	--	--	--
REVSH	.27816	.830	.15908	1.014
Z_1	-.05563	-.121	.04760	.221
Z_2	-.14442	-.353	-.07993	-.418
Z_3	-.08160	-.155	-.11265	-.459
Z_4	-.21647	-.519	-.18553	-.950
Z_5	-1.02080	-2.541*	-.52815	-2.811*
Z_6	-.44678	-.739	-.35514	-1.256
Z_7	-.13606	-.274	-.18464	-.795
Z_8	.22176	.418	.37039	1.493
AOG	.00764	.143	.00027	.011
Z_1	-.05927	-.921	-.05082	-1.707**
Z_2	-.00582	-.109	.00245	.010
Z_3	.00300	.049	-.00155	-.055
Z_4	-.00909	-.147	-.01223	-.422
Z_5	-.01274	-.218	-.03294	-1.205
Z_6	-.03684	-.571	-.03511	-1.164
Z_7	.00293	.045	.00513	.170
Z_8	-.01057	-.191	-.00678	-.262
R^2	.4953		.6530	
Standard error	1.337		.6252	
F ratio	2.436*		4.671*	

*Significant at 5%
**Significant at 10%

Table 14

REGRESSION COEFFICIENTS AND "T" VALUES
REVENUE SHARING AND ALL OTHER GRANTS
FIRST DIFFERENCES - ABSOLUTE
All States

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	-1.42800	-.996	-.32840	-.472
R_1	1.09520	.802	.88476	1.334
R_2	-.22492	-.177	-.15612	-.253
R_3	-.17762	-.139	-.03899	-.063
R_4	.06426	.049	-.00730	-.011
R_5	.15414	.115	.49378	.361
R_6	.00088	.001	.21508	.287
R_7	.86457	.571	.35599	.484
R_8	.28740	.198	.59964	.850
INC	.00281	3.148*	.00117	2.700*
POP	--	--	--	--
LIQ	--	--	--	--
FED	-.06126	-1.639	-.02477	-1.366
STAT	.03094	1.811**	.01037	1.249
REVSH	.32147	.986	.20210	1.276
Z_1	-.14087	-.312	.00117	.005
Z_2	-.13355	-.335	-.08692	-.449
Z_3	-.02096	-.041	-.07595	-.304
Z_4	-.20822	-.512	-.20614	-1.043
Z_5	-1.05760	-2.702*	-.56903	-2.992*
Z_6	-.42108	-.724	-.40749	-1.442
Z_7	-.07513	-.154	-.18342	-.776
Z_8	.14673	.285	.30308	1.213
AOG	.00777	.149	.00155	.061
Z_1	-.0624	-.997	-.05440	-1.799**
Z_2	-.00289	-.055	.00170	.067
Z_3	.01365	.228	.00393	.135
Z_4	-.00669	-.110	-.01358	-.461
Z_5	-.01109	-.194	-.03382	-1.217
Z_6	-.04324	-.688	-.03704	-1.214
Z_7	-.00571	-.090	.00322	-.105
Z_8	-.00621	-.115	-.00338	-.129
R^2	.5183		.6427	
Standard error	1.306		.6344	
F ratio	2.672*		4.466*	

*Significant at 5%
**Significant at 10%

Table 15

REGRESSION COEFFICIENTS AND "T" VALUES
REVENUE SHARING AND ALL OTHER GRANTS
FIRST DIFFERENCES - PERCENTAGE
All States

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	-1.67900	-.363	1.59000	.461
R_1	2.60900	.506	2.65990	.692
R_2	-2.21220	-.430	-1.55210	-.405
R_3	-1.96790	-.385	-.16769	-.044
R_4	-1.90110	-.375	-1.28640	-.341
R_5	5.41970	1.022	2.29720	.581
R_6	-1.03080	-.168	1.21390	.265
R_7	2.22350	.372	.84732	.189
R_8	13.52800	2.224*	6.02040	1.327
INC	.43059	1.986*	-.00155	-.010
POP	.54487	.781	-.06296	-.119
LIQ	-.06336	-1.853**	-.03295	-1.292
FED	--	--	--	--
STAT	--	--	--	--
REVSH	.31869	.869	.13936	.5100
Z_1	-.09945	-.177	.10446	.249
Z_2	-.31329	-.657	.11345	-.319
Z_3	-.00591	-.010	-.09486	-.207
Z_4	-.70958	-.526	-.69988	-.696
Z_5	-.89127	-1.856**	-.83602	-2.335*
Z_6	-.81372	-1.208	-.58975	-1.174
Z_7	.03443	.057	-.24317	-.537
Z_8	2.23750	3.950*	.93073	2.203*
AOG	-.02216	-.075	-.07632	-.344
Z_1	-.43660	-1.167	.33311	-1.194
Z_2	.15337	.491	.14128	.606
Z_3	.09477	.257	.03409	.124
Z_4	.06737	.164	.05707	.187
Z_5	-.32953	-1.006	-.18021	-.738
Z_6	-.35991	-.822	-.23866	-.731
Z_7	.13458	.312	.15064	.469
Z_8	-.31792	-.914	-.07836	-.302
R^2	.7510		.5533	
Standard error	5.262		3.924	
F ratio	7.488*		3.075*	

*Significant at 5%
**Significant at 10%

Table 16

REGRESSION COEFFICIENTS AND "T" VALUES
REVENUE SHARING AND ALL OTHER GRANTS
FIRST DIFFERENCES - PERCENTAGE
All States

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	-1.57600	-.278	1.12100	.274
R_1	3.80820	.710	3.48020	.898
R_2	-3.26110	-.618	-2.26470	-.594
R_3	-1.96820	-.379	-.85748	-.228
R_4	-1.46260	-.279	-1.45330	-.383
R_5	4.29410	.791	1.77170	.451
R_6	-.80367	-.129	.68211	.151
R_7	2.60130	.422	1.18720	.267
R_8	15.25600	2.665*	5.62200	1.359
INC	.34694	1.557	-.04361	-.271
POP	--	--	--	--
LIQ	--	--	--	--
FED	-.12846	-.859	-.13029	-1.205
STAT	.05814	.821	.06220	1.215
REVSH	.46655	1.268	.23662	.890
Z_1	-.05746	-.099	.07942	.189
Z_2	-.32001	-.650	-.14298	-.402
Z_3	.05519	.087	-.04138	-.091
Z_4	-.81572	.591	-.78336	-.786
Z_5	-1.00540	-2.056*	-.91528	-2.590*
Z_6	-.87619	-1.265	-.63508	-1.268
Z_7	-.11540	-.185	-.25407	-.564
Z_8	2.31070	4.185*	.86066	2.156*
AOG	-.06370	-.208	-.10617	-.479
Z_1	-.42975	-1.111	-.32670	-1.168
Z_2	.25524	.793	.21734	.934
Z_3	.22347	.592	.13377	.490
Z_4	.12361	.291	.09657	.315
Z_5	-.26766	-.792	-.14353	-.587
Z_6	-.31464	-.702	-.24490	-.756
Z_7	.23406	.532	.18814	.569
Z_8	-.31045	-.870	-.04759	-.184
R^2	.7353		.5538	
Standard error	5.426		3.922	
F ratio	6.896*		3.092*	

*Significant at 5%
**Significant at 10%

Table 17

REGRESSION COEFFICIENTS AND "T" VALUES
REVENUE SHARING AND ALL OTHER GRANTS
FIRST DIFFERENCES - ABSOLUTE
Excludes Alaska and the District of Columbia

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	-.43060	-.341	.36440	.701
R_1	.73191	.525	.65955	1.150
R_2	-.24772	-.171	-.10407	-.175
R_3	-.09616	-.073	.04277	.079
R_4	-.01814	-.014	-.08659	-.159
R_5	-.07556	-.055	.35433	.624
R_6	.11079	.068	.52626	.783
R_7	.25367	.165	.22217	.352
R_8	-.39889	-.247	.06872	.103
INC	.00148	1.090	-.00057	-1.020
POP	-.00032	-.119	-.00137	-1.230
LIQ	.00057	.204	-.00064	-.557
FED	--	--	--	--
STAT	--	--	--	--
REVSH	.23729	.693	.08401	.596
Z_1	-.01990	-.043	.09365	.490
Z_2	-.14663	-.341	-.05344	-.302
Z_3	-.04233	-.080	-.09918	-.453
Z_4	-.20084	-.477	-.15273	-.882
Z_5	-.90587	-2.189*	-.37267	-2.188*
Z_6	-.36304	-.594	-.25966	-1.033
Z_7	-.12300	-.246	-.15452	-.751
Z_8	-.26328	-.438	-.13175	-.533
AOG	.00434	.081	-.00459	-.208
Z_1	-.05222	-.811	-.00400	-.1510
Z_2	.00584	.096	.00985	.394
Z_3	.00902	.147	.00259	.102
Z_4	-.00470	-.075	-.00529	-.206
Z_5	-.00263	-.044	-.02044	-.839
Z_6	-.03226	.492	-.02654	-.989
Z_7	.00875	.134	.00921	.343
Z_8	.00477	.082	.00809	.337
R^2	.2697		.5279	
Standard error	1.344		.5531	
F ratio	.866		2.622*	

*Significant at 5%
**Significant at 10%

Table 18

REGRESSION COEFFICIENTS AND "T" VALUES
REVENUE SHARING AND ALL OTHER GRANTS
FIRST DIFFERENCES - ABSOLUTE
Excludes Alaska and the District of Columbia

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	-1.14500	-.673	.25620	.356
R_1	.99064	.712	.76342	.1297
R_2	-.48346	-.339	-.12509	-.207
R_3	-.24744	-.189	-.07734	-.140
R_4	-.06222	-.046	-.10332	-.179
R_5	.03043	.023	.34794	.608
R_6	.07764	.050	.33631	.509
R_7	.81028	.524	.28540	.406
R_8	-.24887	-.162	-.12649	-.194
INC	.00143	1.087	-.00062	-.109
POP	--	--	--	--
LIQ	--	--	--	--
FED	-.05051	-.987	-.01311	-.605
STAT	.03033	1.663**	.00633	.820
REVSH	.24941	.752	.10874	.774
Z_1	-.09561	-.210	.06460	.335
Z_2	-.17979	-.429	-.07678	-.433
Z_3	-.00980	-.019	-.07482	-.340
Z_4	-.17522	-.427	-.16685	-.960
Z_5	-.92131	-2.279*	-.39385	-2.302*
Z_6	-.32928	-.559	-.30084	-.1206
Z_7	-.04362	-.089	-.15356	-.738
Z_8	-.21372	-.373	-.19054	-.785
AOG	.00288	.055	-.00410	-.184
Z_1	-.05152	-.816	-.04164	-1.559
Z_2	.01864	.310	.01248	.490
Z_3	.01710	.282	.00643	.251
Z_4	.00005	.0001	-.00584	-.225
Z_5	-.00003	.000	-.02048	-.833
Z_6	-.03544	-.558	-.02670	-.992
Z_7	-.00213	-.033	.00821	.304
Z_8	.00203	.036	.00865	.358
R^2	.2997		.5211	
Standard error	1.316		.5570	
F ratio	1.0004		2.552*	

*Significant at 5%
**Significant at 10%

Table 19

REGRESSION COEFFICIENTS AND "T" VALUES
REVENUE SHARING AND ALL OTHER GRANTS
FIRST DIFFERENCES - PERCENTAGE
Excludes Alaska and the District of Columbia

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	2.17500	.609	3.46100	1.075
R_1	3.37050	.857	3.08020	.869
R_2	-1.42040	-.344	-.76320	-.205
R_3	1.85270	.471	1.58860	.448
R_4	1.01740	.262	.07927	.023
R_5	5.14490	1.264	2.01230	.549
R_6	4.05970	.856	3.57080	.836
R_7	6.24050	1.348	2.57680	.618
R_8	4.36200	.904	1.27030	.292
INC	-.29254	-1.479	-.34583	-1.941*
POP	-1.34490	-2.249*	-.97233	-1.805**
LIQ	.07942	-2.201*	-.03276	-1.007
FED	--	--	--	--
STAT	--	--	--	--
REVSH	.00085	.003	.0082	.032
Z_1	.09736	.226	.20526	.530
Z_2	-.15258	-.408	-.02308	-.069
Z_3	-.18249	-.390	-.16986	-.1433
Z_4	-.48560	-.472	-.61766	.666
Z_5	-.43417	-1.162	-.63700	-1.893**
Z_6	-.54737	-1.063	-.47425	-1.022
Z_7	-.05990	-.128	-.30640	-.729
Z_8	-.01300	-.024	-.20946	-.433
AOG	-.03658	-.161	-.08643	-.423
Z_1	-.32401	-1.136	-.28078	-1.092
Z_2	.17597	.664	.12680	.531
Z_3	-.02024	-.071	-.00754	-.030
Z_4	.15588	.499	.10070	.358
Z_5	-.22385	.893	-.12542	-.555
Z_6	-.11573	-.345	-.12160	-.402
Z_7	.09436	.284	.14766	.494
Z_8	.04549	.167	.12592	.513
R^2	.4942		.5013	
Standard error	4.007		3.610	
F ratio	2.291*		2.337*	

*Significant at 5%
**Significant at 10%

Table 20

REGRESSION COEFFICIENTS AND "T" VALUES
REVENUE SHARING AND ALL OTHER GRANTS
FIRST DIFFERENCES - PERCENTAGE
Excludes Alaska and the District of Columbia

	Tax effort		Revenue effort	
Variable	Regression coefficient	t Value	Regression coefficient	t Value
Constant	1.51800	.290	2.74300	.604
R_1	3.38030	.842	3.37130	.912
R_2	-1.74990	-.397	-1.20630	-.315
R_3	-1.16690	-.283	-.43184	-.121
R_4	-1.02210	-.242	-1.18650	-.323
R_5	3.49880	.820	1.44960	.391
R_6	.92015	.187	1.46530	.343
R_7	2.75050	.563	1.17440	.277
R_8	.61767	.125	-.89623	-.208
INC	-.25837	-1.304	-.29606	-1.791**
POP	--	--	--	--
LIQ	--	--	--	--
FED	-.00243	-.015	-.07170	-.499
STAT	.01511	.259	.03606	.710
REVSH	.25300	.871	.14638	.580
Z_1	.07600	.167	.14133	.357
Z_2	-.23965	-.606	-.08330	-.242
Z_3	-.02439	-.049	-.07990	-.185
Z_4	-.92271	-.853	-.83621	-.890
Z_5	-.68181	-1.765**	-.77922	-2.321*
Z_6	-.71051	-1.307	-.56707	-1.201
Z_7	-.05558	-.114	-.23674	-.557
Z_8	-.17612	-.315	.25401	-.515
AOG	-.07577	-.315	-.10902	-.522
Z_1	-.33748	1.109	-.29078	-1.100
Z_2	.23073	.810	.16848	.681
Z_3	.17029	.574	.10473	.406
Z_4	.15123	.455	.10383	.354
Z_5	-.18597	-.701	-.11212	-.486
Z_6	-.22127	-.629	-.20579	-.673
Z_7	.23786	.689	.18639	.621
Z_8	.09583	.332	.14833	.592
R^2	.4310		.4779	
Standard error	4.250		3.694	
F ratio	1.776		2.146*	

*Significant at 5%
**Significant at 10%

CHAPTER VI

SUMMARY AND CONCLUSIONS

During the last two decades, the proportion of the nation's resources, as measured by Gross National Product, devoted to the production of state and local government services increased from almost 10 percent in 1960 to almost 14 percent in 1979. While the role of Federal grants-in-aid increased in importance in state and local finance (13 percent of expenditures in 1960 and 24 percent in 1979), state and local government expenditures financed by their own revenues increased from 8.6 percent of GNP to 10.5 percent in 1979. To some extent, the increase in these ratios was due to the fact that the prices paid by state and local governments for purchases of goods and services increases faster than the price level in general. Removing the influence of the changing relative prices shows that state and local expenditures as a proportion of GNP increased from 11.6 percent in 1960 to 13.1 percent in 1979 when both are measured in constant 1972 dollars. The rising trend of the ratio of state and local expenditures to GNP during the period has not been uniform; the decade of the 1960's saw a rapid rise in the above mentioned ratio, while in the 1970's the trend has been relatively flat. This is true when measured in both current and constant dollars.

Although the trends of the ratio of state and local government expenditures to GNP--both total expenditures and the total less Federal grants--are quite similar,it is not possible from these data to determine the influence that Federal aids have on state and local expenditures. That is, during the period covered, the rise in Federal aids could have been responsible for the growth in state and local expenditures financed by their own revenues; or the rapid rise in grants could have depressed the relative rate of growth of state and local expenditures, or they could have had little impact on this trend. Due to the heterogeneity as to social and economic characteristics of the political jurisdictions which receive these grants, the response, as measured by changes in fiscal effort, would differ. To be more specific, it was hypothesized that higher income regions, due to their greater diversity, degree of urbanization, and other characteristics, would be more responsive to these grants than lower income areas. For example, if two jurisdictions were confronted with the same Federal grant on a per capita basis, there would be a relatively greater increase in fiscal effort, from their own sources, in the area with the higher income (or a relatively smaller decrease in fiscal effort if the grant is considered substitutive). However, the results obtained do not necessarily support this hypothesis.

As shown in the appendix tables (see Tables 5-8), the impact of the changes in per capita grants on state and local fiscal effort is not statistically significant, except in the Western region. In that region, fiscal effort varies inversely with changes in Federal aid. Excluding Alaska from that regional configuration, the tables show that while changes in grants and fiscal effort vary inversely, the net regression

coefficients are not statistically significant. When Federal grants are divided as to social welfare grants and all other grants the overall results are not significantly better (see Tables 9-12). Changes in all other Federal grants vary inversely with changes in tax effort in the MID region, although there does not appear to be any relationship between changes in tax effort and changes in social welfare grants. In the West, the net regression coefficients for changes in social welfare grants are again negative and highly significant. When Alaska and the District of Columbia are excluded, changes in social welfare grants are not statistically related to changes in fiscal effort and other grants are subsitutive (see Tables 11 and 12). For the four-year period 1972-1976 only, division of the Federal grant system into General Revenue Sharing grants and all other grants yields the best results, in terms of explaining interstate variations in fiscal effort (R^2), overall (see Tables 13-20). From the tables in the previous chapter, changes in Revenue Sharing grants led to reductions in fiscal effort in the Plains States and increases in the Far West. In New England, changes in other grants appear to cause reductions in fiscal effort--an unexpected result. When Alaska and the District of Columbia are excluded, this pattern remains virtually unaltered, except that the regression coefficients for the Far West become statistically insignififant.

It may be concluded, judging from the regression results, that during the period studied (fiscal years 1960 through 1976), changes in per capita Federal grants were <u>not</u> a determining factor in the observed secular increase in state and local fiscal effort. As far as General Revenue Sharing grants are concerned, the temporary nature of the program during this period would lead one to expect that their impact on fiscal

effort, in the short-run, would not be significant. Using the analogy of the individual consumer, one would expect that temporary increases in income would lead to only modest increases in current consumption, with the remaining increase to be used either for savings or increasing the purchases of durable goods. Similarly, if the budget makers at the sub-national levels of government viewed these funds as a "windfall," they would be expected either to increase their savings by paying off past debts or adding to cash balances, or to purchase capital goods (which are consumed over a period of time). While the prospect of being able to reduce tax rates would probably appeal to these budget makers for political reasons, the prospect of being forced to increase tax rates in the future should the program be discontinued would, in all probability, be politically unappealing. For these reasons, it was not expected that the changes in General Revenue Sharing grants would lead to either reductions or increases in tax rates in the short-run. If this program became a permanent fixture in the system of Federal grants, perhaps these grant funds would be used for tax reduction.

Another somewhat unexpected result is the relationship between changes in per capita Personal Income, lagged one year, and changes in fiscal effort. It had been hypothesized that these variables are directly related, i.e., that changes in per capita Personal Income would cause changes in fiscal effort in the same direction. However, the results reveal an inverse relationship between these variables. As explained earlier, a distinction must be made between long-term trends and short-run (annual) fluctuations. It is expected that, over time, increasing levels of per capita Personal Income and levels of fiscal effort would be directly correlated. However, in the short-run, increases in per

capita Personal Income could lead to unanticipated increases in revenues; these unanticipated increases in locally generated revenues could be used for tax rate reductions in subsequent periods. Therefore, an inverse relationship between changes in per capita Personal Income in one period and changes in the level of fiscal effort in the following period is not necessarily unreasonable.

Other results, which were not unexpected, were that the state share of total state and local tax revenues as positively correlated with changes and fiscal effort; and that the larger the share of total state-local revenues accounted for by Federal funds, the smaller the change in fiscal effort. That is, ceteris parabus, in those states where the state has relatively greater responsibility for revenue raising, there are generally greater changes in fiscal effort. Again, although no tests were made to support this hypothesis, it is plausible: a) that it is generally easier (politically) to raise taxes at the state level than at the local level; and/or b) that due to increasing reliance on personal income taxes,[1] state revenues would increase faster than Personal Income over time.[2] As for the inverse relationship between the proportion of

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[1]In fiscal year 1960 individual income taxes accounted for 12.2 percent of state tax revenues and 25.7 percent in 1978. Tax Foundation, Inc., Facts and Figures on Government Finance (Washington, D.C.: Tax Foundation, 1979), p. 183.

[2]State tax collections as a percent of Personal Income rose from 4.51 percent in 1960 to 7.39 percent in 1977. Local tax collections as a percent of Personal Income in those years were 4.52 and 5.45, respectively. U.S. Department of Commerce, Bureau of the Census, Governmental Finances in 1960, pp. 36, 37 and Governmental Finances in 1977, pp. 68, 69.

total state and local revenues accounted for by Federal funds and changes in fiscal effort, this may be explained by the fact that, in general, these states are the lower income states and are possibly more apt to substitute Federal funds for their own funds, over time.

For the most part, the model used here did not "explain" a large proportion of the variance in changes in state and local fiscal effort over time. In those instances where a statistically significant relationship was obtained, the explanatory power of changes in Federal grants was usually small. This result, by itself, may have been as significant. By ignoring the changes in the relative prices between state and local government goods and private goods caused by the grants, and examining only the income effects of the grants, it appears that, in the aggregate, Federal grants are additive. That is, they do not cause the recipients to reduce taxes, nor do they cause them to raise taxes. This, of course, does not mean that grants do not affect state and local spending decisions; the composition of that spending may be affected by Federal grants. It is also possible that these grants will affect different jurisdictions as to the changes they induce in the composition of their spending. Another distinct possibility is that far different results would have been obtained had only states been used as the recipient level of government rather than the state-local aggregate. As previously stated, it is perhaps easier for states to increase tax rates than for the local governments. If this is true, then it would be logical to assume that grants to states alone would be more stimulative, in terms of changing fiscal effort, than grants to the state-local aggregate. However, since the various states differ significantly in terms of the

socioeconomic criteria detailed in previous chapters, it is expected that they would also respond in different manners to Federal grants.

As usual, this paper will end with the remark that more research needs to be done in this area. This is not intended to be a facetious remark; it would be helpful for Federal policy makers to be able to predict how different areas would react to changing economic conditions or other stimuli. For example, in an economic downturn, which areas would raise tax rates in order to maintain levels of services, which areas would be most likely to reduce expenditures, or which areas would do nothing but use funds from accumulated surpluses, if any; this knowledge would allow for greater predictability of aggregate state and local spending changes. This knowledge would, of course, allow policy makers to better evaluate the results of changes in grant design or the implementation of new grant programs (or the elimination of certain grant programs).

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[1]For U.S. averages 1960-1976. Data on a state-by-state basis was obtained from various issues annually, 1960 through 1977.