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THE DYNAMICS OF THE EFFECTS OF REVENUE SHARING ON TAX-EFFORTS OF STATE AND LOCAL GOVERNMENTS

by

YOUSUF RAHMAN

A dissertation submitted to the Graduate Faculty in Economics in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1983

This manuscript has been read and accepted for the Graduate Faculty in Economics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Professor Herbert Geyer

Professor Michael Grossman

Professor Salih Neftci

The City University of New York

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During the last couple of years I spent on the dissertation, Professor Geyer has guided me between being overtly ambitious on the one side and naive on the other. Most of all I would like to extend my gratitude to him specially because he was never unwilling to spare his time when he was on a sabbatical leave

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS iii

Chapter

INTRODUCTION 1

I. REVENUE SHARING IN THE U.S. 5

II. SHORT REVIEW OF THE LITERATURE 12

III. ADDED FEDERAL TAX BURDEN DUE TO GRANTS-IN-AID: FROM PARTIAL TO GENERAL SETTING 40

IV. SETTING UP THE HYPOTHESIS 59

V. REVENUE SHARING ALLOCATION PROCEDURE . 68

VI. INCOME-FLOW MODEL 77

VII. TAX-EFFORT COEFFICIENT 85

VIII. EMPIRICAL FINDINGS 94

CONCLUSION 106

. . . .

APPENDIXES 110

SELECTED BIBLIOGRAPGY 121

ILLUSTRATIONS

Diagram

1. Tree Diagram Showing Types of U.S. Federal Grants-in-Aid 7

2. The Basic Conventional Model 46

3. Categorical Matching Grants and Pigovian Tax 48

4. Added Federal Tax-Burden in the Conventional Model 52

5. Added Federal Tax-Burden in the Tax-Burden Model 57

6. Block Diagram of the Income-Flow Model . . 78

Exhibit

1. Stages of Revenue Sharing Allocation Procedure 71

TABLES

1. Comparison of Income Elasticities of Taxes in the U.S. 30

2. Benefitted States and their Tax-Efforts . 103

INTRODUCTION

Broadly speaking Federal Grants-in-Aid are designed to promote effective fiscal federalism. The parallel existence of a national and sub-national governments could result in allocative inefficiency and inequity from a national context. The efficacy of a federal categorical matching grant to internalize benefit spillovers of sub-national government expenditures is an old idea. In the U.S. such a well founded idea was actually put to practice two decades back and gradually expanded.

The tremendous surge in recent years of total U.S. Federal Grants-in-Aid is however more attributable to the growth of broad-based and general purpose grants. Income inequality across sub-national jurisdictions, difference in the need for sub-nationally provided services, unequal fiscal stress exerted by sub-national governments and such other inequities led to the expansion of Federal grant expenditures in recent years. In simple figures U.S. Federal Grants-in-Aid totalled $23 billion in 1950 and increased to about $91 billion in 1980. Percent wise this is 5.3% of total Federal Outlays in 1950 and about 16% in 1980. No wonder one of the most

discussed aspects of the public sector in the U.S. in recent days is intergovernmental aid. In the U.S. the initiation of unconditional federal grants to State and Local Governments in 1972 under the popular term Federal Revenue Sharing has aroused more interest on the topic resulting in a series of lectures, conferences, seminars and numerous articles published and unpublished.

Out of the numerous publications, those that can be grouped to fall within the domain of economic literature, have in most cases compared the program and welfare effects of different kinds of grants. The literature is replete with neo-classical partial-equilibrium models, whose conclusions in most cases are straight forward and unambiguous within the context of a narrower and unrealistic world. For instance based on any of these micro models, an unconditional grant should necessarily lower fiscal effort of the recipient government more than a conditional grant. Yet after almost a decade since such an unconditional grant system was implemented in the U.S., the so sanguine fiscal-stress relieving potentiality of these grants is in serious question.

Obviously most of these partial-equilibrium models with their long list of "other things

remaining constant" have not been sufficiently pragmatic. In the U.S., federal revenue sharing is allocated to states and local governments using two different formulas that incorporate Need, Fiscal-Stress, and Fiscal Capacity of the recipient state/ local jurisdiction. The distortionary effects of these formulas on activities of the recipient jurisdictions in turn should also be taken into consideration. A macro treatment in a simultaneous world is asked for.

This thesis is directed to filling this gap. In the pursuit of this venture, constraints that confront state and local governments decision making like income and tax differentials and federal-state net transfers have been identified and incorporated. The work is specifically aimed at unravelling the theoretical conditions that underly the state's reaction with their tax-efforts in the face of federal revenue sharing. The objective of federal revenue sharing has been to relieve the state and local governments from fiscal stress. Hence, it is expected that state and local governments with high fiscal stress would lower their tax-efforts after the introduction of revenue sharing. This work initially tries to theoretically identify the macro conditions

that ought to be satisfied for this objective to be attained. A tax-effort coefficient will be derived using an income-flow model, and finally the conditions are estimated for each state separately in an attempt to empirically explore whether tax-efforts would ultimately decline or not after the introduction of revenue sharing.

CHAPTER I

REVENUE SHARING IN THE U.S.

Place of Revenue Sharing in the Grants-in-Aid Structure

The structure of the U.S. federal Grants-in-Aid system is complex. Need, fiscal capacity, tax-effort, externality, and cost necessitate the introduction of different types of suitable grants. A neat categorization in line with the format presented in 1968-69 by Mushkin and Cotton[1] in their noted work in the field is too aggregative. It is more justifiable to subdivide into more types on top of the ones outlined in their study so as to include the different types of grants based on allocation procedure.

The budget of the U.S. makes the following general classification:

1. Categorical grants, earmarked for relatively more specific types of local expenditures.

2. Broad-based aid (or Block grants), tied to broad expenditure categories, with a good amount of discretionary latitude within each grant.

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[1]Selma Mushkin and John Cotton, Sharing Federal Funds for State and Local Needs: Grant-in-Aid and P.P.B. Systems, (New York: Praeger, 1969).

3. General purpose aid (or Unconditional grants), includes general revenue sharing as the major component and also anti-recession fiscal assistance.

In the U.S. categorical grants comprise about 65 percent of the total. Musgrave and Musgrave[1] show that based on allocation procedure there are atleast six types of categorical grants. A matrix of division could be based on whether in the grant allocation procedure fiscal capacity has been allowed for or not, whether the grant requires matching or not, and whether the matching provision is uniform or variable.

Block grants are administered to broad program categories as community development, manpower training, law enforcement, and education, using formulas for each. For instance, the Better Communities Act of 1973 has provision for grants for urban renewal, such that all cities with more than fifty thousand persons would receive assistance under a formula. Such assistance also depend on the number of persons below the poverty level. Under block grants, local governments have discretion to determine

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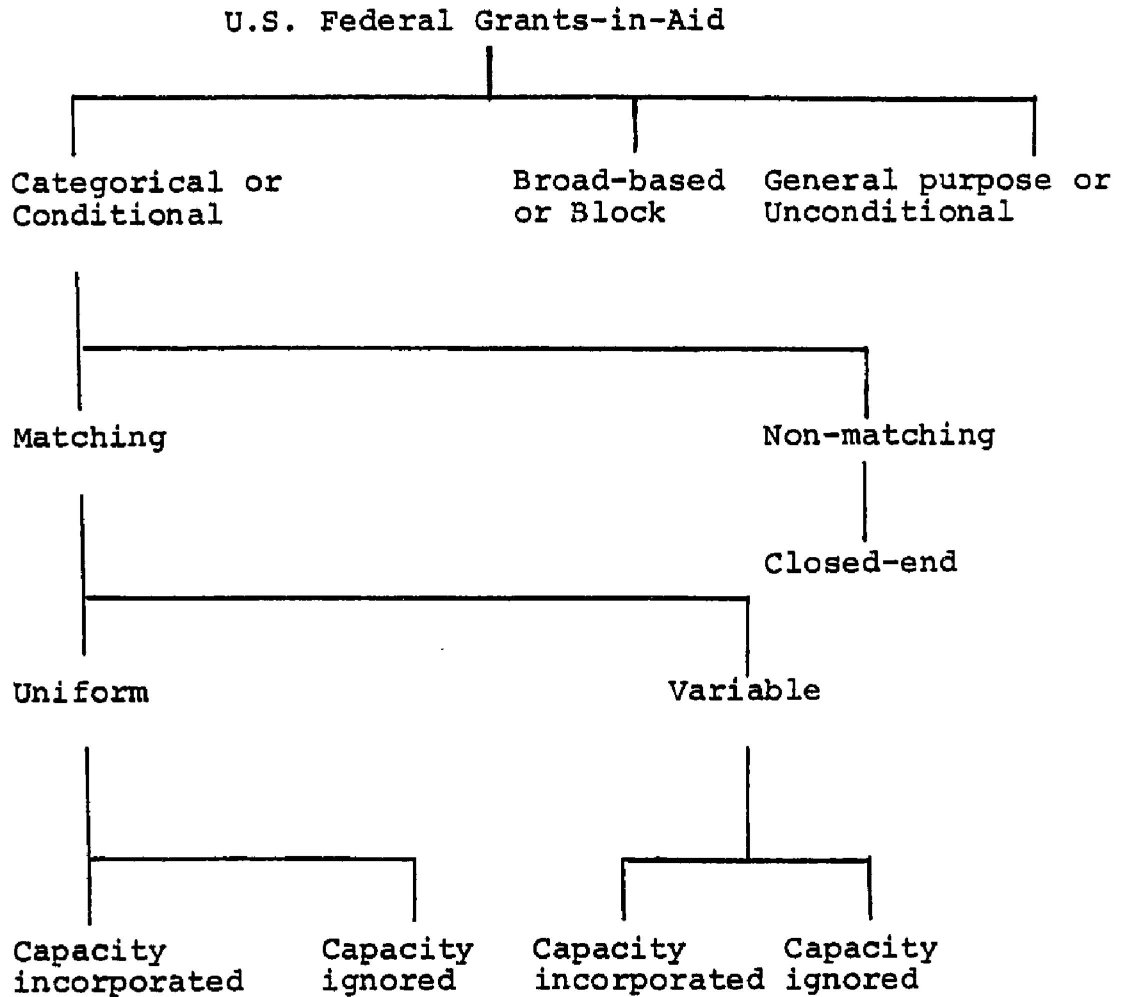
[1]Richard Musgrave and Peggy Musgrave, Public Finance in Theory and Practice, 3d ed., (New York: McGraw-Hill, 1980), p. 532.



Matching grants can be further divided into Open-end and Closed-end.

TREE DIAGRAM SHOWING TYPES OF U.S. FEDERAL GRANTS-IN-AID

priorities and plan, and implement the programs.

Allocation of general revenue sharing to states is determined by the House and Senate formulas that incorporate need, fiscal capacity, and tax-effort in a complex way. Anti-recession fiscal assistance is determined by the quantum of general revenue sharing and the unemployment rate. Both types of grants are unconditional for all practical purposes. Detailed explanation of the GRS allocation formulas appear at a latter stage.

Revenue Sharing in Retrospect

Nathan, Manvel, and Calkins[1] point out that general assistance grants are not a new experience for the United States. In 1803, Congress earmarked 5 percent of the income from sale of federal lands (one of it's main source of income) for distribution to the contributing states and advised to be used for transportation and education with no penalty for not following so. Later in the 1830's about $28 million was distributed to the states out of accumulating federal surplus in accordance with the Surplus Distribution Act of 1836. No major federal redistribution

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[1]Richard Nathan, Allen Manvel, and Susannah Calkins, Monitoring Revenus Sharing, (Washington D.C.: The Brookings Institution, 1975).

of revenue was undertaken for more than a century.

In the 1950's the Congress felt it necessary to introduce bills in favor of some kind of unconditional grants. In 1958, a bill was introduced that called for an amount to be distributed as shared revenue by taking out funds from categorical grants. It did not pass. Then in October 28, 1964, President Johnson in his campaign statement observed that, "At the state and local level, we see responsibilities rising faster than revenues, while at the federal level an average annual growth of some $6 billion provides a comfortable margin for federal tax reduction, federal programs, and more generous help to state and local units."[1] To materialize his contention, a task force under Joseph Pechman and Walter Heller was formed, which submitted it's report on November 11, 1964. Unexpectedly, however as Nathan, Malvin, and Calkins[2] mention, President Johnson dropped the entire plan for a general revenue sharing, probably because the plan was leaked out and that he might have anticipated a strong opposition.

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[1]U.S. Presidential Statement #6 on Economic Issues, Strengthening State-Local Government, (Washington D.C.: Government Printing Office, 1964)

[2]Nathan, Malvin, and Calkins, Monitoring Revenue Sharing.

No serious attempt was made to revive the issue untill President Nixon took it up again in the late 60's and early 70's. The famous Nixon Revenue Sharing Bill was introduced to the House on September 23, 1969 by thirty-three senators. The rationale presented were in line with the Heller-Pechman proposal; namely need and fiscal mis-match.

The Ninety-first Congress covering the period 1969-70, basically ended with a good amount of support for a federal revenue sharing program, and an agreement to continue the debate in the Ninety Second Congress. After another two years of debates and political lobbying during the entire life of the Ninety-Second Congress (1970-72), the State and Local Fiscal Assistance Act was finally passed by the House on June 21, 1972. Later, after slight modification to the House formula, the Senate approved it's own version of the formula on September 12, 1972. The House version gave more weights to highly populated urban states and states that earned its' revenue from income taxes. The Senate formula favored basically the low income states. A compromise was proposed by the Senate Finance Committee and the House Ways and Means Committee in the following lines: Each state would receive it's allocation under whichever formula

would give it the higher amount. But since total allocation for each year is fixed, the individual allocation to states would have to be scaled down to meet this constraint.

CHAPTER II

SHORT REVIEW OF THE LITERATURE

Introduction

The need for categorical matching grant is theoretically attributed to the fact that a sub-national government would only consider the utility that can be derived within it's own jurisdiction in the production of public goods, and thereby ignore the spillover of benefits that such public goods can effectively generate to surrounding jurisdictions. The resultant inefficiency in economic activity according to the Pigovian rationale can be corrected by distributing a unit subsidy (i.e., a categorical matching grant) equal to the value at the margin of the spillover benefit it creates.[1] Buchanan's case for unconditional grant came to be recognized when he pointed out that even intra jurisdictional horijontal equity is sought to be maintained by the central government with it's fiscal instruments and the sub-national governments do the same, from the

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[1]A.C. Pigou, The Economics of Welfare, 4th. ed. (London: Macmillan, 1932), part 2.

standpoint of the nation as a whole inter jurisdictional horizontal equity is not necessarily guaranteed.[1] Because, with an identical need for public goods, the wealthier of the two jurisdictions will be able to meet it's requirements with lower tax rates. The central government according to Buchanan should institute a program of unconditional grants to poorer localities, inorder to equalize fiscal capacity of all jurisdictions.

So far as revenue sharing comes to be analogous to unconditional grants, the entire literature on federal Grants-in-Aid is relevant. The Grants-in-Aid literature is replete with comparative analysis of categorical and unconditional grants on the basis of rationale, and welfare and program effects. A review of the revenue sharing literature will therefore be incomplete without an adequate consideration of the entire Grant-in-Aid literature. Fewer works have however addressed specific issues of federal revenue sharing in the U.S. One of the reasons being that a comprehensive revenue sharing program in this

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[1]James Buchanan, "Federalism & Fiscal Equity", American Economic Review, vol. XL, no. 3 (September, 1950), pp. 583-599; reprinted in Homewood, Illinois: Richard D. Irwin, 1959, American Economic Association, Readings in the Economics of Taxation), pp. 93-109.

country was started only a decade ago. In this respect works have mostly centered on exploring the income and fiscal distributive effects.

Debate on the Pigovian Rationale

The Pigovian theory of matching grants remained unscathed for atleast a decade, untill the first assault by Anthony Scott in 1950.[1] Scott pointed out that inter and intra jurisdictional equi-marginal product of resources and labor is automatically ensured by mobility within and across such jurisdictions. If the sole aim is to maximize national product then this automatic mechanism should not be disturbed. Transfers of government income from place to place counteract this incentive to labour mobility and thus prevent the maximization of national production. Similar questions against federal transfers were also raised by Buchanan and Stubblebine[2] who attributed this likelihood of inefficiency to the introduction of a program of government grants as it provides incentives for further modifications in community behavior. The refutations of Ronald Coase are also

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[1]Anthony Scott, "A Note on Grants in Federal Countries", Economica, vol. XVII, no. 68 (November, 1950), pp. 416-422.

[2]James Buchanan and William Stubblebine, "Externality", Economica, vol. 29 (November 1962), pp. 371-384.

not unknown in the literature; that if potential inefficiency brought about by externality are resolved through voluntary collective action among the communities, the Pigovian prescription would only aggravate the situation.[1]

Buchanan[2] attempted to critically examine the validity of Scott's arguments. Speaking about the resource allocative effects of federal income transfers in general, he argues that, in so far as the income transfer tends to reduce the net out-migration of unskilled and semi-skilled labor from the low-income states, it may be considered "resource distorting". But, in so far as it tends to reduce the net out-migration (or increase net in-migration) in the ranks of the highly skilled technicians, professional people, and potential entrepreneurs, the transfer is "resource correcting".

One of the drawbacks of the Pigovian partial equilibrium models is that using a community utility and income constraint framework, the redistributional

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[1]Ronald Coase, "The Problem of Social Cost", Journal of Law and Economics, vol. 3 (October 1960), pp. 1-44.

[2]James Buchanan, "Federal Grants and Resource Allocation," Journal of Political Economy, vol. 60 (June 1952), pp. 208-217.

effects between communities have been demonstrated without taking into account the derived benefits to the nation as a whole due to grants. Wilde[1] uses a Bowen-Samuelson type pure public goods model to demonstrate that grants are crude and inefficient means of accomplishing redistributional goal. He points out that in the application of benefit theory each interested group was asked to help finance that good in accordance with true (though perhaps not voluntarily revealed) evaluation of the goods benefits. Wilde then goes on to say that if the nation is helping a community, it can also be said to help the nation in making the extra production possible. Therefore it makes no more sense to say that grant money redistributed to the community than to say that the community is redistributing the same amount to the nation; rather the benefit funding should be viewed as being distributionally neutral.

Ronald Teeples[2] integrates the Tax-Burden approach and a dual public goods utility framework

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[1]James Wilde, "Grants-in-Aid: The Analytics of Design and Response," National Tax Journal, vol. XXIV (June 1971), pp. 143-155.

[2]Ronald Teeples, "A Model of Matching Grant-in-Aid Program with External Tax Effects," National Tax Journal, vol. XXXIV, no. 3-4 (1979), pp. 316-331

to demonstrate what he calls the peril of conditional matching grant-in-aid programs that are not designed to reduce collection costs or external effects in the choices of subordinate governments. It was shown that, "even where each subordinate government finds the terms of the grant proposal acceptable, and naively pursues the capture of "outside" funds, at least some must be made worse off by the grant program. And to the extent that no interregional redistribution takes place, all of the subordinate governments will be left worse off."[1] Teeples obviously criticised categorical matching grant for violating Pareto Optimal criterion, where each subnational government unit is regarded as an individual in the welfare literature. He proves this by assuming that a subordinate government is able to calculate the fraction of each dollar of grant funds raised by the superior governments that will be collected from the subordinate government's own revenue sources.

Attacking all kinds of federal grants in general, Roger Faith[2] in a recent article argues that

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[1]Ibid., p.486.

[2]Roger Faith, "Local Fiscal Crises and Intergovernmental Grants: A Suggested Hypothesis," Public Choice, vol. 34, no. 3-4 (1979), pp. 316-331.

the provision of intergovernmental grants on the basis of perceived welfare levels creates a Samaritan's Dilemma and induces local governmental units to compete with one another to appear more deserving. In his view, the apparent unwillingness of many local governments to solve their own financial problems internally indicates that they expect aid from higher level governments.

Direct Impact on Expenditures

A significant amount of the literature on federal grants deal with only the program effects of different kinds of grants from a purely positive point of view. That federal grants to state and local governments will exert a stimulating effect on those functions to which it is directed (in the case of categorical grants) and to most functions in general (in the case of unconditional grants) have been proved unambiguously in the literature.[1]

Original theoretical exploration on this issue was made by Sacks and Harris,[2] and Bahl and

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[1]One of the widely used text for a discussion on this issue is the already cited work by, Mushkin and Cotton, Sharing Federal Funds for State and Local Needs.

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

Saunders.[1] But Wilde[2] was the first to attempt to draw on standard economic analysis of individual behavior and apply it to a local governmental unit. His static model clearly brings out the following conclusions:

1. Specific non-matching aid may have no different allocative effects then general non-matching aid.
2. If specific non-matching grants are larger than what the locality would spend on the aided function in their absence, the specificity provisions may have allocative significance.

Wilde however was aware of the assumptions and drawbacks of his static partial equilibrium approach. He admits that the overall stimulas of different types of grants may be positive, negative or zero, depending on the differential incidence of central and local taxes, the extent of tax exportation and varying marginal propensities to spend on the aided function.

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

[2]James Wilde, "The Expenditure Effects of Grant-in-Aid Programs," National Tax Journal, vol. XXI (September 1968), pp. 340-348.

Gramlich[1] postulates a quadratic utility function that incorporates expenditures separately for those tied to matching grants and those out of own funds, and private after tax income for state and local governments. Empirical findings based on the derived constrained maximization conditions point to stimulation of local expenditure as a result of both matching and block grants. In a later study by Gramlich and Galper[2] an additional exploration was attempted to statistically estimate the dynamic response of grants. They discovered that response of current expenditures and taxes to changes in previous balances or exogenous inflow of funds seemed sluggish. Their results show that the impact response of a $1.00 inflow does not bring about a significant increase in expenditures and/or reduction in taxes. In the second year the response is 25 percent of $1.00, and in the third year it is 50 percent. From a similar theoretical foundation, but using Full-Information Maximum Likelihood Estimates, recently

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[1]Edward Gramlich, "Alternative Federal Policies for Stimulating State and Local Expenditures: A Comparison of their Effects," National Tax Journal, vol. XXI, no. 2 (June 1968), pp. 119-129.

[2]Edward Gramlich and Harvey Galper, "State and Local Fiscal Behavior and Federal Grant Policy," Brookings Papers on Economic Activity, no. 1 (1973), pp. 15-66.

James Follain Jr.[1] also shows that revenue sharing did not relieve tax-efforts of individual states.

The restrictive conditions under which the partial equilibrium models operate are well known. Louis James[2] points out two such assumptions that make an analysis of grants unrealistic. Firstly, recipient states are assumed to act as pure competitors in a constant price world; and secondly, recipient states are assumed to be able to generate additional quantities of real goods and services. James however concludes from his "qualitative" analysis that, ". . . the general equilibrium solutions differ little from the partial equilibrium solutions; however the importance of this analysis is that sizable programs will, in the general case, yield these results only if the partial equilibrium assumption of constant prices is violated."[3]

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[1] James Follain Jr, "Grants Impacts on Local Fiscal Behavior: Full Information Maximum Likelihood Estimates," Public Finance Quarterly, vol. VII, no. 4 (October 1979), pp. 478-500.

[2] Louis James, "The Stimulation and Substitution Effects of Grants-in-Aid: A General Equilibrium Analysis," National Tax Journal, vol. XXVI, no. 2 (June 1973), pp. 251-265.

[3] Ibid., p.264.

In a recent article Jurion[1] extends the conventional two-goods model to the case of 'n' goods. This enabled him to take account of local public goods that are substitutes amd complements, more explicitly and comprehensively. According to Jurion the results of the traditional model do not necessarily follow as expected. ". . . if only the privileged good is granted by central government or also if all the granted goods are substitutes of it, the traditional result is still proved. But when other granted goods are complements of the good central government want to promote consumption, the result is undetermined and it is very possible that the use of lump-sum grants will be less costly than that of matching grants."[2]

The "Distortion Thesis"

The most investigated question in the grant literature has been whether categorical grants to specific expenditure types stimulate expenditures on non-aided types or not. Originally, implied in the

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[1]B.J. Jurion, "Matching Grants and Unconditional Grants: The Case with n Goods," Public Finance, vol. XXXIV, no. 2 (1979), pp. 234-244.

[2]Ibid., p. 244.

works of Maxwell[1], and Heller[2], the "Distortion Thesis" holds that generally, "if a state government had reached a rational revenue-expenditure distribution before the federal aid became effective, this is now completely distorted because of the greater utility given to a dollar spent in a particular direction."[3] More specifically, the "Distortion Thesis" hypothesises that the introduction of matching conditional grants to state and local governments often induce lower-level governments to neglect activities that do not receive federal funds in favor of those that are federally supported, thus distorting the optimum. It is automatically implied therefore that unconditional grants are more efficient.

To the contrary, Jack Osman[4] for the first time empirically verified that except for highway and welfare expenditures, federal aid brings about an increase in expenditures even in non-aided

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[1]James Maxwell, The Fiscal Impact of Federalism in the United States, (Cambridge: Harvard University Press, 1946)

[2]Walter Heller, New Dimension of Political Economy, (Cambridge: Harvard University Press, 1966)

[3]Maxwell, Fiscal Impact of Federalism in the United States, p. 349.

[4]Jack Osman, "The Dual Impact of Federal Aid on State and Local Government Expenditures," National Tax Journal, vol. XIX, no. 4 (December 1966), pp. 362-72.

functions. For instance each $1.00 increase in federal aid to all functions other than education was associated with a $0.52 increase in educational expenditures. He gives two underlying possibilities for this stimulating effect to non-aided functions. "First, federal aid to a given function could release resources for use in other functions, for debt retirement and/or tax reduction. Secondly, the receipt of federal aid which, in general, will increase outlay for the function to which it is directed, also may lead to increased outlays for complementary function."[1] Following Osman, Smith[2] correctly points out that the "Distortion Thesis" is based on the implicit assumption that the demand for the aided public good is price elastic. Also according to Smith, on the other hand distortion will also simply be indicated by a reduction in state-local unaided public expenditures as a result of matching conditional grants. It follows therefore, that in a log-linear equation form the sign of the coefficient of grants (i.e., the grant elasticity of expenditures) should be signific-

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[1]Ibid., p. 371.

[2]David Smith, "The Response of State and Local Governments to Federal Grants," National Tax Journal, vol. XXI, no. 3 (September 1968), pp. 349-357.

cantly negative. However, his findings once again do not support the "Distortion Thesis". It leads him to conclude that ". . . a major effect of conditional federal grants to state and local governments is to release funds for expenditures on those functions not receiving direct federal support."[1] Other notable works that find evidence for a stimulating effect on the non-aided functions are by Bishop, Haskell, and Henderson.[2]

Objection to Buchanan's Contention

Buchanan's rationale for unconditional grants have met with some criticisms also. Scott asserts that, "Complete over-all horizontal equity is not achieved (in a system of fiscal federalism without unconditional grants), chiefly because its achievement is not a prime goal in federation."[3]

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[1]Ibid., p. 356.

[2]George Bishop, "Stimulative versus Substitution Effects of State School Aid in New England," National Tax Journal, vol. XVII, no. 2 (June 1964) pp. 133-143; Mark Haskell, "Federal Grants and Budgetary Distortion," Quarterly Review of Economics and Business, vol. II, no. 2 (May 1962), pp. 79-87; James Henderson, "Local Government: A Social Welfare Analysis," Review of Economics and Statistics, vol. L, (May 1968)

[3]Anthony Scott, "The Economic Goals of Federal Finance," Public Finance, vol. XIX, no. 3 (1964), p. 251.

Therefore, any horizontal inequity beyond the federal government's own fiscal set-up for the nation as a whole, and the state and local governments fiscal set-up within their own jurisdictions is not a major fiscal objective within a federal wystem of government.

Musgrave[1] sees horizontal inequity across sub-national jurisdictions as a price of decentralized fiscal system. Such inequities according to Musgrave are the side-effects of interjurisdictional shifting of tax burdens, the levying of many state and local taxes on firms instead of directly on individuals, and differing cost functions for local public services rendered. Buchanan's case for different levels of income across jurisdictions being only one of the many sources of horizontal inequity in a federal system.

Oates[2] goes all the way to prove with an illustration that any kind of unconditional grant in a single national income-tax rate structure is bound to produce some perverse income redistributive

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[1]Richard Musgrave, "Approaches to a Fiscal Theory of Political Federalism." In Public Finances: Needs, Sources, and Utilization, National Bureau of Economic Research (New Jersey: Princeton University Press, 1961)

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

effects. "The problem is that even relatively poor communities usually contain some wealthy persons, and , similarly, rich jurisdictions often have some poor residents. As a result, in some cases, the intergovernmental grants may well tend to exxagerate rather than reduce the existing degree of inequality in the distribution of income; some income will tend to move from persons of lower incomes to relatively wealthy individuals. . . . To achieve a just distribution of income among the individuals in a nation, a national program that redistributes income among individuals, not among jurisdictions, is the preferred alternative."[1] As clearly implied, Oates is in favor of a national negative income-tax program, with differential rates across jurisdictions.

The "Perversity Hypothesis"

The fiscal mismatch between the federal and state-local is an aspect of what has long been known in the literature as the "perversity hypothesis." In 1944, Hansen and Perloff[2] investigated the built-in-flexibility of state-local revenue and expenditu-

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[1]Ibid., p. 81.

[2]Alvin Hansen and Harvey Perloff. State and Local Finance in the National Economy, (New York: Norton, 1944).

res and brought out a depressing picture of the situation. The "perversity hypothesis" in their own words is the disturbing conclusion that since ". . . state and localities have in fact followed the swings of the cycle and have thereby intensified the violence of economic fluctuations. . . unless their fiscal systems are planned in relation to the federal stabilization program, they are likely to nullify in large measure the national counter-cyclical activities."[1] While trying to empirically find evidence for this, Rafuse Jr. points out that "the low income elasticity of the state and local revenue system restricts the contribution of the system to built-in-flexibility. If expenditures are more elastic than revenues, state and local fiscal behavior will be cyclically perverse."[2]

One of the original supporters of a revenue sharing program in the U.S. for correcting the federal and state-local fiscal mismatch was Walter Heller.[3] He argued in favor of distributing the growing fiscal

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[1]Ibid., p. 199.

[2]Robert Rafuse Jr., "Cyclical Behavior of State-Local Finances," in Essays in Fiscal Federalism, ed. Richard Musgrave (Washington D.C.: The Brookings Institution, 1965), pp. 65-66.

[3]Heller, New Dimension of Political Economy.

dividends of the federal government because of the high elasticity of the federal income taxes. Concurring with him Pechman writes, ". . . state and local tax receipts are too sluggish to keep up with the growth in expenditures without frequent rate increases. State governments rely most heavily on sales taxes and local governments on the property tax, both of which respond no more than in proportion to income. As I have already indicated, expenditures by the state and local governments rise by which more than the growth in income. Some thing needs to be done to increase the responsiveness of the state and local receipts to the growth of the economy."[1]

In a more technical sense, economists were actually referring to the differential in the yield elasticity of taxes. Specifically, types of taxes imposed by the state-local governments have a lower yield elasticity compared to types of taxes imposed by the federal government. Table 1 gives a picture of different studies showing elasticity differences. It is very important to note however, that the yield elasticity of income-tax is more than unity for all studies which explored the issue essentially because

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[1]Joseph Pechman, "Fiscal Federalism for the 1970's," National Tax Journal, vol. XXIV, no. 3 (September 1971), p. 282.

Table Showing Comparison of Income Elasticities of Taxes in the U.S.

Study by:	Personal Income Tax	Corporate Income Tax	General Property Tax	General Sales Tax
I. Harris	1.80	1.16	N.E.	1.00
II. Netzer	1.70	1.10	1.00	1.00
III. Davies	N.E.	N.E.	N.E.	1.00
IV. Rafuse	N.E.	N.E.	0.80	1.27
V. Greytak & Tussig	1.70	1.10	0.98	1.00

I. Robert Harris, Income and Sales Taxes: The Outlook for States and Localities, (Chicago: Council of State Governments, 1966)

II. Dick Netzer, "Financial Needs and Resources Over the Next Decade," in National Bureau of Economic Research, Public Finances: Needs, Sources, and Utilization. (Princeton: Princeton University Press, 1961)

III. David Davies, "The Sensitivity of Consumption Taxes to Fluctuations in Income," National Tax Journal, vol. XV (September 1962), pp. 281-290.

IV. Robert Rafuse, "Cyclical Behavior of State-Local Finances," in Richard Musgrave, (ed) Essays in Fiscal Federalism, (Washington D.C.: Brookings Institution, 1965).

V. David Graytag and Dale Taussig, "Revenue Stabilizing Grants: A Proposal," Proceedings of the Sixty-Fourth Annual Conference on Taxation, National Tax Association, Kansas City, MO, Columbus Ohio, National Tax Association, September 26-30, 1971. pp. 47-54.

of the progressive rate structure typical of this type of tax. It is an old established equation that:

$$\eta_{T,Y} = (\eta_{t,B} + 1)\,\eta_{B,Y}$$

And it is known that,

$\eta_{t,B} > 1$, for progressive tax-rate.

$\eta_{t,B} = 1$, for proportional tax-rate.

Where:

$\eta_{T,Y}$ = GNP elasticity of tax.

$\eta_{t,B}$ = tax-rate elasticity w.r.t. it's base.

$\eta_{B,Y}$ = tax-base elasticity w.r.t. GNP.

Since factor shares and division of output may change in the short-run $\eta_{B,Y}$ may vary from unity for different types of taxes. In that case if $\eta_{t,B}$ is unity (for most taxes other than income-taxes) variation in $\eta_{T,Y}$ in the short-run is due to changes in $\eta_{B,Y}$. For income-taxes since $\eta_{t,B}$ is greater than unity, short-run elasticity would be much greater than unity depending on how $\eta_{B,Y}$ behaves in the short-run. On long-run elasticity Musgrave and Musgrave makes a theoretical proposition that, "Taking a long-run view, we find that factor shares and the division of output between consumption and investment show little change. This implies that the base of all taxes varies at more or less the same rate as does GNP. In other words, the yield elasticity of most

tax bases is close to unity. Income tax revenue does, however show a higher elasticity, owing to the progressive nature of tax rates."[1]

Some supporters of general revenue sharing would definitely criticize the long-run stability concept of tax base elasticity. In one of his original works Heller that, "The income tax base, . . . has grown from $65 billion in 1946 to $128 billion in 1955, to $210 billion in 1963, and the estimated $300 billion in 1967 - and has risen from 31 percent of gross national product in 1946 to an estimated 38 percent in 1967. By 1972, the federal income tax base should grow to $425 billion (assuming a 6 percent annual growth in money gross national product, and the income tax base growing 20 percent faster than gross national product). So a 2 percent of base share would reach $8½ billion by 1972. Truly, a share in federal income tax would be a share in U.S. economic growth."[2]

If there is a secular tendency of the income

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[1] Musgrave and Musgrave, Public Finance in Theory and Practice, p. 557, footnote.

[2] Walter Heller, "A Sympathetic Reappraisal of Revenue Sharing", in Revenue Sharing and the City, ed. Harvey Perloff and Richard Nathan (Baltimore: John Hopkins Press, 1968), p. 9.

tax base elasticity to remain greater than one coupled with a progressive rate structure; the long-run yield elasticity of income tax is definitely quite high compared to other taxes. It is interesting to note that proponents of general revenue sharing have cited this built-in-flexibility of income taxes as a rationale.

Is Revenue Sharing Price Distortionary?

Both the House and Senate allocation formulas incorporate relative tax-effort (the state's tax-effort as a proportion of the sum of the same for all states) as one of the aid determining factors. Relative tax-effort according to the proponents of revenue sharing is the best proxy for fiscal stress, so that the more is the value of this parameter the more should be the grant allocation. Economists have however, time and again questioned it's inclusion in the allocation formulas, because it can cause adverse welfare consequences to kill the very income redistributive objective of revenue sharing.

Basically, critics point out that the inclusion of the relative tax-effort factor creates a price effect in favor of locally produced public goods. First identified by Goetz, and later followed by

Johnson and Mohan, Bradford and Oates, and Marvin Johnson[1], who maintain that since an increase in revenues by a subsidiary government results in an increase in revenue sharing funds to that government assuming all other factors constant, the net cost of financing additional public goods expenditures is reduced. The relative price of public goods is there fore lowered for that subsidiary government. The undesirable implication is that as sub-national expenditures are increased they automatically get financed by the regressive state and local tax structure.

The effort index atleast theoretically creates an incentive for the local jurisdiction to engage in either strategic behavior or collective action. Strategic behavior in this case occurs in a zero-sum game environment (because total revenue sharing entitlement is fixed), and therefore there can only be an increase in the quantum of grant for one or some at

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[1]Charles Goetz, "Federal Block Grants and Reactivity Problem," Southern Economic Journal, vol. XXXIV, no. 1 (July 1967), pp. 160-165; Darwin Johnson and Charles Mohan, "Revenue Sharing and the Supply of Public Goods," National Tax Journal, vol. XXIV, no. 2 (June 1971), pp. 157-167; David Bradford and Wallace Oates, "The Analysis of Revenue Sharing in a New Approach to Collective Fiscal Decisions," Quarterly Journal of Economics, vol. LXXXV, no. 3 (August 1971), pp. 416-439; Marvin Johnson, "Recognizing the Competitive Nature of General Revenue Sharing Grants," Southern Economic Journal.

the cost of other states, or all states end up just maintaining status quo. Collective action on the other part of the state and local governments could however result in reduced sub-national tax-efforts beyond that expected as a normal reaction to an unconditional grant, because reduced tax-effort in equal magnitude by all sub-national jurisdictions does not lower relative tax-effort of any one jurisdiction. Maxwell, therefore argues that, "the most formidable reason why the bonus (or penalty) will have a weak and defused effect over time is the relative nature of tax-effort. If increased effort of state X will not secure a bonus . . . . . In short, the bonus for taxing more and the penalty for taxing less are reduced by the uncertainty of the outcome. . . ."[1] Since the tax-effort factor could also produce interjurisdictional competition for revenue sharing grant, Fisher[2] points out, the result could be increased sub national public expenditure accompanied by welfare loss, which seems to be a curious type of sub-nation-

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[1]James Maxwell, "Tax Effort as a Determinant of Revenue Sharing Allotments," Harvard Journal of Legislation, vol. X, no. 4 (December 1973).

[2]Ronald Fisher, "A Theoretical View of Revenue Sharing Grants," p. 181.

al government expenditure stimulation.

In another stimulating article Maxwell[1] mentions two factors that make an effort factor crude. Firstly, a state may have a high/low factor because it's government has preference/dislike for public goods or they have, 'made fiscal errors'/'have been frugal', in the past. But the allocation formulas do not have provision to take this past behavior into consideration. Secondly, equal effort connotes that relative tax-efforts should equalize across jurisdictions. But it is plausible to argue that rich states have more tax-effort augmenting capability than poor states. A bonus for increase in tax-effort seems therefore to discriminate against poor states.

Drawing arguments in the same line Thurow reminds, that "the objective is not to reward effort but to achieve an optimum income distribution and undertake the correct amount of investment."[2]

Revenue Sharing as an Income Equalizer

One of the most widely used test of revenue

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[1]James Maxwell, "Revenue Effort as a Determinant of Grants," Journal of Economic Issues, (September 1972), pp. 142-145.

[2]Lester Thurow, "The Theory of Grants-in-Aid," National Tax Journal, vol. XIX, no. 4, p. 377.

sharing is whether it has succeeded as an income equlizer or not. Some studies have explored the strength of the negative correlation between per-capita income and revenue sharing grant embodied in the Senate and House formulas. Yet other have done emperical econometric studies to find the actual effect of these grants on per-capita income.

Nathan, Manvel, and Calkins[1] analyze "net redistribution effects" by computing net gain/loss for each state. A gain/loss has been computed by deducting prorated fraction of federal receipts from shared revenue, where it is assumed to be financed by states in proportion to their estimated contributions to all federal receipts. Revenue sharing seems to perform better as an income equalizer when such gain/loss is considered, than by reference only to per-capita shared revenue. "Many of the supporters of revenue sharing who favor it as an investment for equalizing economic conditions among the states regard this effect of the program as one of its most positive features."[2] However the same study with reference to revenue sharing and the one made by

[1]Richard Nathan, Anthony Manvel, and Susannah Calkins, Monitoring Revenue Sharing, (Washington D.C.: The Brookings Institution, 1975.

[2]Ibid., p. 73.

Haskell[1] with reference to total federal grants, find that states with large land areas and low population density received proportionately greater amounts of grant funds than smaller high density areas.

The income redistributive effect of revenue sharing has been supported by Fisher from a quite a different angle, when he points out that, "as a redistributive devise revenue sharing surely has more than a modest equalizing tendency,"[2] because revenue sharing is more likely financed by federal income taxes, which because their progressive structure better fit into the equal sacrifice equity criterion than state imposed regressive taxes.

Recently Holcombe and Zardkoohi[3] came up with econometric evidence that seem to prove that the entire revenue sharing process is more of a political juglery and an income redistributive illusion. Based on their cross-sectional results, revenue sharing and also total federal grants seem to be statistically insignificant with respect to both per-capita income

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[1]Mark Haskell, "Federal Grants and the Income Density Effect," National Tax Journal, vol. XV, (March 1962), pp. 105-108.

[2]Fisher, "A Theoretical View of Revenue Sharing Grants," p. 181.

[3]Randall Holcombe and Asghar Zardkoohi, "Determinants of Federal Grants," Southern Economic Journal, vol. XLVIII, no. 2 (October 1981), pp. 391-399.

and the percentage of the population below the poverty level. In their view political lobbying is a more important factor in determining federal grants, and find evidence for their assertion. It will atleast not be too naive to suspect that in general politicians are largely interested in income distribution only to the extend that it furthers their self interest.

CHAPTER III

ADDED FEDERAL TAX BURDEN DUE TO GRANTS-IN-AID: FROM PARTIAL TO GENERAL SETTING

Introduction

The welfare and program effects of categorical and unconditional grants can be analysed by both the Traditional model using a bi-sectoral private-public good utility function, and the Tax Burden model using public expenditures and taxes in a general utility framework. Although, both models exhibit significant program effects due to categorical grants and income and fiscal effects due to unconditional grants, the following analysis would prove that the same conclusions are considerably weakened if the added federal burden of financing these grants are simultaneously considered.

From a pragmatic viewpoint any kind of federal grant would logically have to be financed by one or more of the following:

1. Increase in federal revenues.
2. Decrease in other federal expenditures.
3. Decrease in other types of grants not in question.
4. Increase in federal debts.

An exploration of welfare and program effects should then look into the issue from this modified context. An in-depth analysis on this issue remains absent in the literature. The following is an attempt to present the significance of such an analysis.

Works on federal grants have so far viewed the problem from a purely partial equilibrium settinng, with a few notable exceptions. By assuming, ". . . that the introduction of a new grant program or an increase in an existing one is accompanied by an increase in federal taxes sufficient to fully finance the change in grants," Ronald Fisher concludes that, ". . . if an individual pays less taxes to the central government to finance the grant than he would pay in local taxes to make the same amount of revenue available to his local government, that individual is effectively better off and thus desires a larger quantity of public good."[1] Objections to the Revenue Sharing Bill on this issue were voiced by notable Congressmen and Economists.[2] For instance, on January 26, 1971 representative Wilbur Mills outlined three

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[1]Ronald Fisher, "A Theoretical View of Revenue Sharing Grants," National Tax Journal, vol. 32, no. 2 (June 1979), p. 175.

[2]The Revenue Sharing Bill was introduced on September 23, 1969 by thirty-three U.S., senators.

eventually unavoidable possibilities that directly face the question of how the cost of revenue sharing would be met; firstly, by an increase in federal tax revenue . . . ; secondly, by a prorated curtailment of existing programs of categorical aid to state and local governments; and thirdly, by a prorated reduction in all other federal spending.[1]

It is clear therefore as Stephen Dresch remarks that, ". . . on a net basis not everyone can gain . . . . In fact, a cost must be effectively imposed upon someone, whether directly and obviously as through tax increases (and consequent reductions in non-federal government budgets) or indirectly and less apparantly through alternative federal programs foregone. In short, to adequately evaluate such a proposal, it is necessary to make atleast some judgement concerning the distribution of the costs as well as the benefits of the program."[2] He then goes on to compute per-capita incidence of alternative programs for all fifty states under the

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[1]U.S., Congressional Record, vol. 117, pt. 1, 92nd Congress, 1st session, 1971, pp. 502-8.

[2]Stephen Dresch, "An "Alternative" View of the Nixon Revenue Sharing Program," National Tax Journal, vol. XXIV, no. 2 (June 1971), pp. 131-42.

following criteria:

1. Net revenue sharing after an income tax Surtax.
2. Net categorical grant after an income tax Surtax.
3. Revenue sharing minus categorical grant substitution.

The results were interesting. States like California, New York, Illinois, Indiana, and others seem to be net losers regardless of whether the revenue sharing is financed by an income tax surcharge or a reduction in categorical grants.[1]

It all therefore boils down to the conclusion that for a more realistic exploration, revenue sharing should be viewed from a qualified general equilibrium context. "In brief general equilibrium analysis of revenue sharing requires that explicit attention be paid to the source of the funds distributed to the states in the form of unconditional grants."[2]

The Modified Conventional Model

The Conventional Model applies standard economic analysis of individual consumer behavior to governmental units. Back in 1952, Scott recognised

[1] Ibid., p. 135.

[2] George Break, "Revenue Sharing - It's Implications for present and future Intergovernmental Fiscal Systems: The Case For," National Tax Journal, vol. XXIV, no. 3 (September 1971), p. 311.

governmental units. Back in 1952, Scott recognised that, "Federal grants is analogous to subsidy . . . (in that) it can be used to augment individual incomes (budgets) or to cheapen certain products (services)."[1] Following Scott, Gramlich noted that, "The conceptual basis . . . is a utility maximization analysis for state and local government . . . . It takes only a few extensions of the same arguments to construct a theory of state and local behavior which can be used to investigate the state and local response to a variety of Federal policies."[2] Wilde[3], recognise the potency of a decssion making body, his assumption of a consistent set of preferences for public and provate goods and services, leads to basically the same framework and conclusion that follows from a community indifference curves maximization subject to their income constraint, which deals grants purely as an augmentation of income.

It is assumed that the local government unit has a utility function that relates utility to priva-

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[1]Anthony Scott, "The Evaluation of Federal Grants," Economica, vol. XIX (November 1952), p. 381.

[2]Edward Gramlich, "Alternative Federal Policies for Stimulating State & Local Expenditures," p. 119.

[3]James Wilde, "The Expenditure Effects of Grants-in-Aid Programs," pp. 340-348.

te and public expenditures. Therefore, we can write the following:

$U = U(X,G)$, the Utility Function.

$Y = X+G$, Budget Constraint without federal grants.

$Y = X+(1-m)G$, Budget Constraint with categorical matching grant.

$Y+A = X+G$, Budget Constraint with unconditional grant.

Where:

X = Private expenditures.

G = Public expenditures.

Y = Locally generated income.

m = Proportion of matching grant.

A = Unconditional grant.

Assuming that the first and second order conditions for constrained maximization prevail, and by comparing the first and the second budget constraints it is easily seen from Figure 1, that a simple one-way categorical grant reflects a pivoting of the budget constraint, and a one-way unconditional grant involves an outward shift of the budget constraint. Comparing the resultant equilibrium points e_2 and e_3 it can be concluded that categorical matching grants exert relatively greater program augmentation due to both income and substitution effects, whereas unconditional

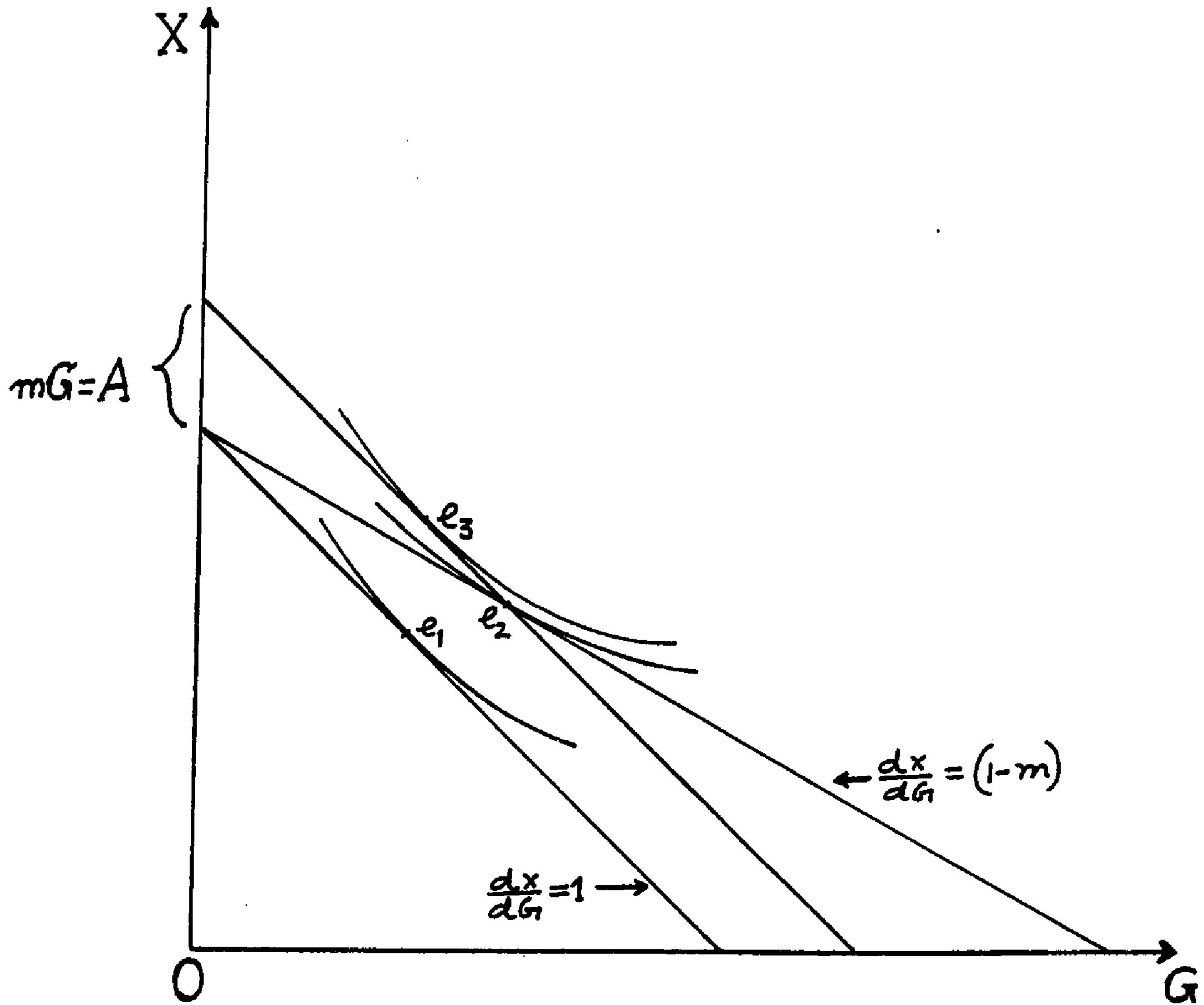

FIGURE - 1

THE BASIC CONVENTIONAL MODEL

grants exert relatively greater welfare augmentation and tax-effort relief due to pure income effect. The analysis in the available literature stops right here without further consideration of the financing side of the grant.

Incorporating Federal Revenue Financed Categorical Grant

In the case of a community generating spillover benefits, it can be shown that categorical matching grants is the most effective prescription. To see this we now turn to Figure 2-a. For a socially efficient level of production we should consider the curve MSB (marginal social benefit out of G) which includes both the benefits to the community as well as the spillover benefits to the other communities. The curve MPB (marginal private benefit out of G) is obviously located to the left of MSB. Without federal grant the community would be optimizing at point g_1, where the price line P_1 intersects MPB with OG_1 level of equilibrium public expenditure. To induce the community to produce upto OG_3 the Pigovian theory of grants logically prescribe a unit subsidy[1] (i.e.

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[1]A clear analytical exposition of the Pigovian theory of grants can be found in Wallace Oates, Fiscal Federalism.

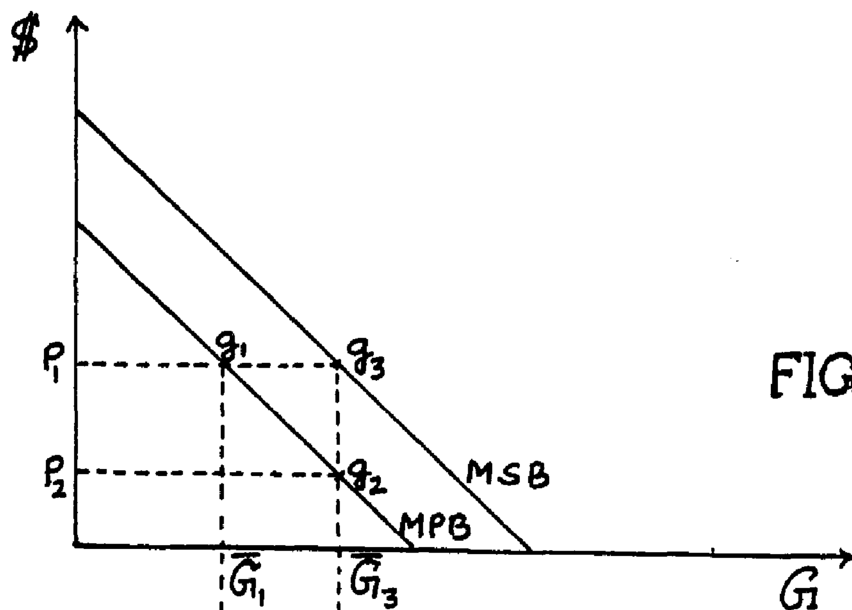

FIGURE-2a

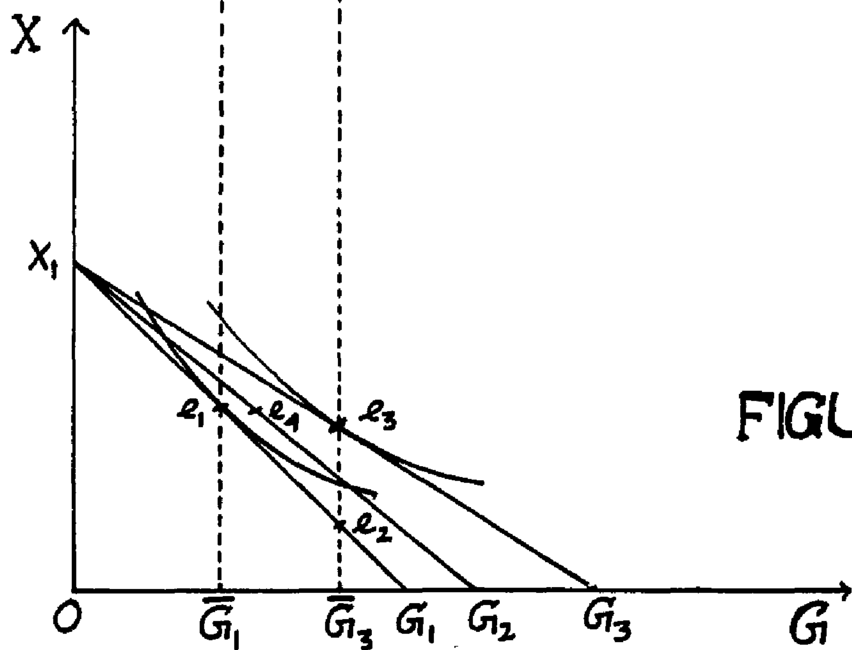

FIGURE-2b

<u>CATEGORICAL MATCHING GRANTS AND PIGOVIAN TAX</u>

categorical matching grant) of size g_2g_3. With a lower price of the public good down from P_1 to P_2, the community would move from equilibrium point g_1 to g_2, and therefore OG_3 would be secured. Correspondingly in the Traditional model, looking at Figure 2-b, we in effect move from e_1 to e_3. To achieve the socially efficient level OG_3, the community requires a unit grant equal to e_2e_3(=mG).

To see how these effects are considerably weakened in the face of federally financed grants, let us assume that grants are financed by federal taxes only. So we impose an additional endogenous federal tax burden on the community such that:
$F = \ell mG$, in the case of categorical matching grant of size mG.
Where:
F = The federal tax burden on the community required to finance the grant.
Assuming that the other flows between the federal and local community remain unaffected, 'ℓ' can be considered a gain/loss parameter. The community is a net gainer, loser, or remains unaffected, as $\ell < 1$, $\ell > 0$, and $\ell = 1$ respectively.

In the case of categorical matching grant, the budget constraint after the incorporation of the

federal tax burden is derived in the following way:

$Y-F = X+(1-m)G$

or, $Y-\ell(mG) = X+(1-m)G$, found by replacing 'F' for lmG

$Y = X+(1-m+\ell m)G$

Therefore, if the categorical matching grant brings about a new imposition of federal taxes equal to 'ℓm' of G, the community's budget constraint as shown in Figure 2-b, will pivot back from position X_1G_1 to X_1G_2. In the case when the burden of federal tax due to categorical matching grant falls entirely on the community, the case when 'ℓ'=1, X_1G_3 will pivot back to original no-grant position X_1G_1. The offsetting effect due to federal tax is not difficult to see.

Incorporating Federal Revenue Financed Unconditional Grant

When it comes to a correction for jurisdictional inequity, unconditional grants (i.e., Revenue Sharing in the U.S.) can be shown to be more effective due to its greater welfare augmenting power. Before the enactment of the U.S. Federal Revenue Sharing Bill, when a series of debates ensued, Pechman, one of the forerunners in favor of revenue sharing remarked: "Thus far, the federal government has relied on categorical grants to transfer fiscal

resources to lower levels of government. Such grants encourage the state and local governments to do certain things that Congress deems to be in the national interest. But they cannot effectively achieve the objective of reducing the great disparities in taxable capacity among units of governments, which is one of the most vital functions of the central government in a federal system."[1]

To exhibit Pechman's rationale for revenue sharing, we observe in Figure 3 that after an unconditional grant of size 'A' the budget constraint shifts from X_1G_1 to X_2G_2, wheras with equal amount in categorical grant the budget line would be X_1G_4.[2] The greater welfare augmenting power of unconditional grant as compared to categorical grant is seen by the higher community indifference curve at f_2. To compare the greater tax-effort reducing power of unconditional grant, we see the following comparison:

In Figure 3, at initial equilibrium f_1,

tax-effort = DX_1/OX_1

After categorical grant, at equilibrium f_4,

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[1]Joseph Pechman, "Fiscal Federalism for the year 1970's," pp. 282-283.

[2]It is equal in the sense that at equilibrium point f_4, unconditional and categorical matching grants are equal in size.

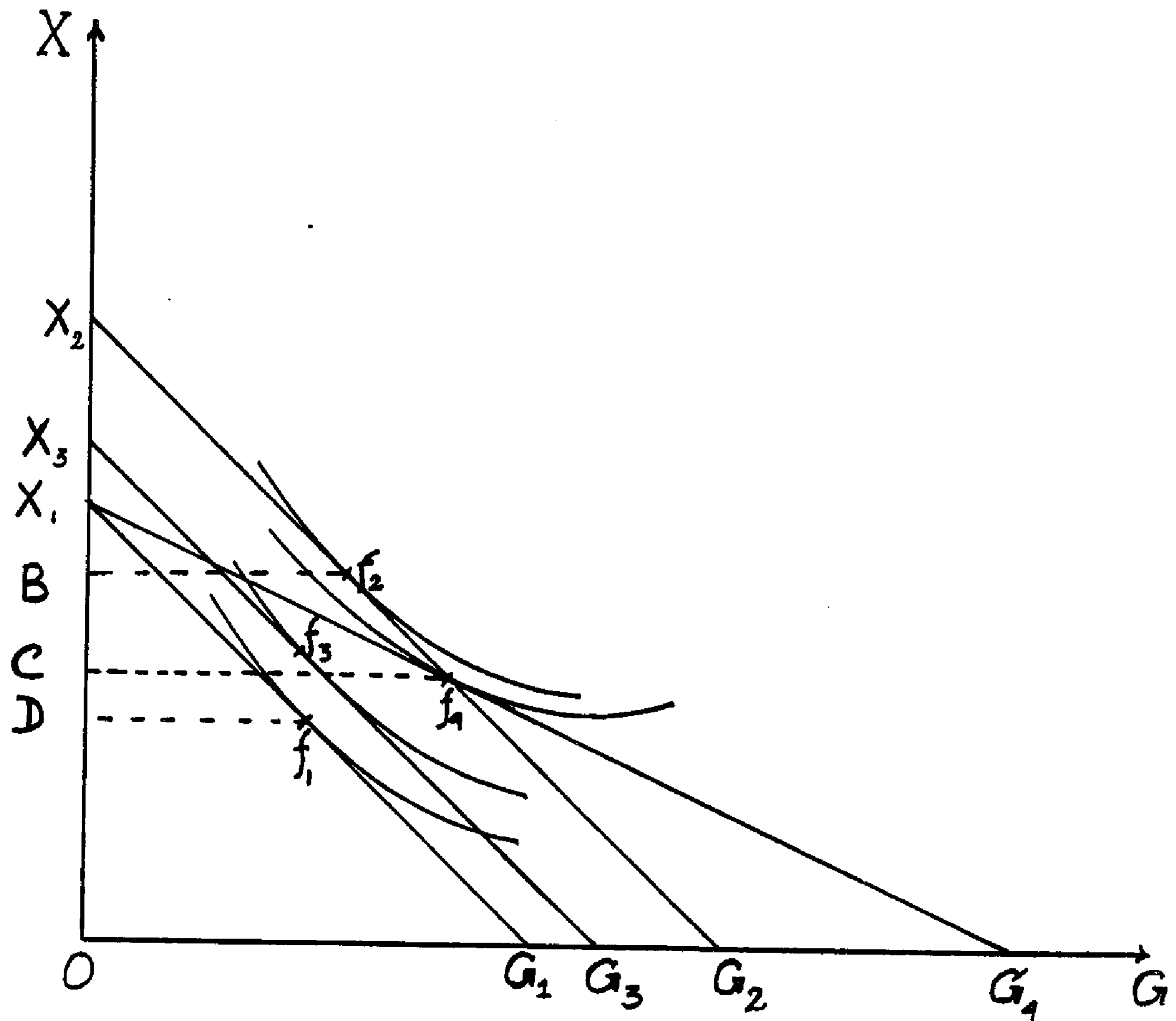

FIGURE-3

ADDED FEDERAL TAX-BURDEN IN THE CONVENTIONAL MODEL

tax-effort = CX_1 / OX_1

After unconditional grant, at equilibrium f_2,

tax-effort = BX_1 / OX_1

Unambiguously, $\left(BX_1 / OX_1\right) < \left(CX_1 / OX_1\right)$.

The contention of this thesis once again is that, after incorporating the added federal tax burden on the community, the welfare augmenting power and tax-effort reducing power of unconditional grant is considerably weakened. To demonstrate this an additional endogenous federal tax burden is imposed on the community in the form of:

$F = \ell A$, in the case of unconditional grant of size A.

The gain/loss factor 'ℓ' is to be interpreted exactly as before. The budget constraint after the incorporation of the federal tax burden is now derived in the following way:

$Y+A-F = X+G$

or, $Y+A-\ell A = X+G$, found by replacing 'F' for lA

$Y+A(\ell-1) = X+G$

The imposition of federal tax to finance the grant, therefore brings about an inward shift of the budget constraint depending of the value of 'ℓ'. In Figure 3, a shift from X_2G_2 to X_3G_3 is shown (assuming $\ell < 1$). Once again if the community shares the entire burden

of the grant the budget line shifts back to it's original position X_1G_1 (i.e., when ℓ=1). The depressing implication for welfare and tax-effort is not difficult to see.

The Modified Tax-Burden Model

The most bothersome assumption in the Traditional model has been the implicit assumption that there is no difference whether the grant is received by the local government or the people directly. Voting a tax reduction and not voting an expenditure increase may not be symmetrical. In a much simplistic way this complication is sought to be overcome by the Tax-Burden model, which treats utility as a function of local public expenditures (G) and local taxes (T).

As an advantage of the Tax-Burden model, although Johnson proves that, "The conventional constrained mazimization model is a special case of the burden model where the assumption of equal tax and income effects is maintained,"[1] it needs to be pointed out that 'tax' as a negative good can only enter the utility function via the budget constraint. An increase in tax can only be conceived indirectly

[1]Marvin Johnson, "Community Income, Intergovernmental Grants and Local School District Fiscal Behavior," Paper presented at a meeting of the Committee on Urban Public Economics, New York, 11-12 Nov. '77.

either as a decline in disposable income and consequently leading to decrease in private consumption and vis-a-vis an increase in public spending in a balanced budget setting. However, for our purpose this drawback may be safely ignored as it will be seen that the welfare and program effects of federal grants already derived using the Traditional model do not differ if the Tax-Burden model is used. The Tax-Burden model is presented in the following form:

$U = U(X,T)$, the Utility Function.

$G = T$, Budget Constraint without federal grants.[1]

$G = T/(1-m)$, Budget Constraint with categorical grant.

$G = T+A$, Budget Constraint with unconditional grant.

Where:

T = Local taxes.

All other notations are exactly as defined earlier.

Once again assuming that the first and second order constrained maximization conditions are satisfied, with respect to categorical grants we observe a swivelling of the budget constraint, and with respect to unconditional grants we get a parallel shift. Both are depicted in Figure 4. The program

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[1]Derivations and interpretations of this and the following budget constraints are given in appendix 1.

augmenting influence of categorical grant, and welfare augmenting and tax-effort releiving effects of unconditional grants can be demonstrated again. These are not taken up again simply to avoid repetition.

Incorporating Federal Revenue Financed Categorical Grant

In the face of federal tax burden, the budget constraint with categorical matching grant becomes:

$G = T/(1-m-\ell m)$,[1]

This has been depicted in Figure 4, under the assumption that $\ell < 1$. By comparing the budget constraint that incorporated only a one way categorical grant transfer with the budget constraint that incorporated an addition federal tax burden, it is once again observed that the latter brings about an offsetting swivel in the community's budget constraint. The program effect is obviously weakened as a result.

Incorporating Federal Revenue Financed Unconditional Grant

In the face of federal tax burden, the budget constraint with unconditional grant becomes:

$G = T+A(1-\ell)$

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[1]Derivation of this and other budget constraints are given in appendix 1.

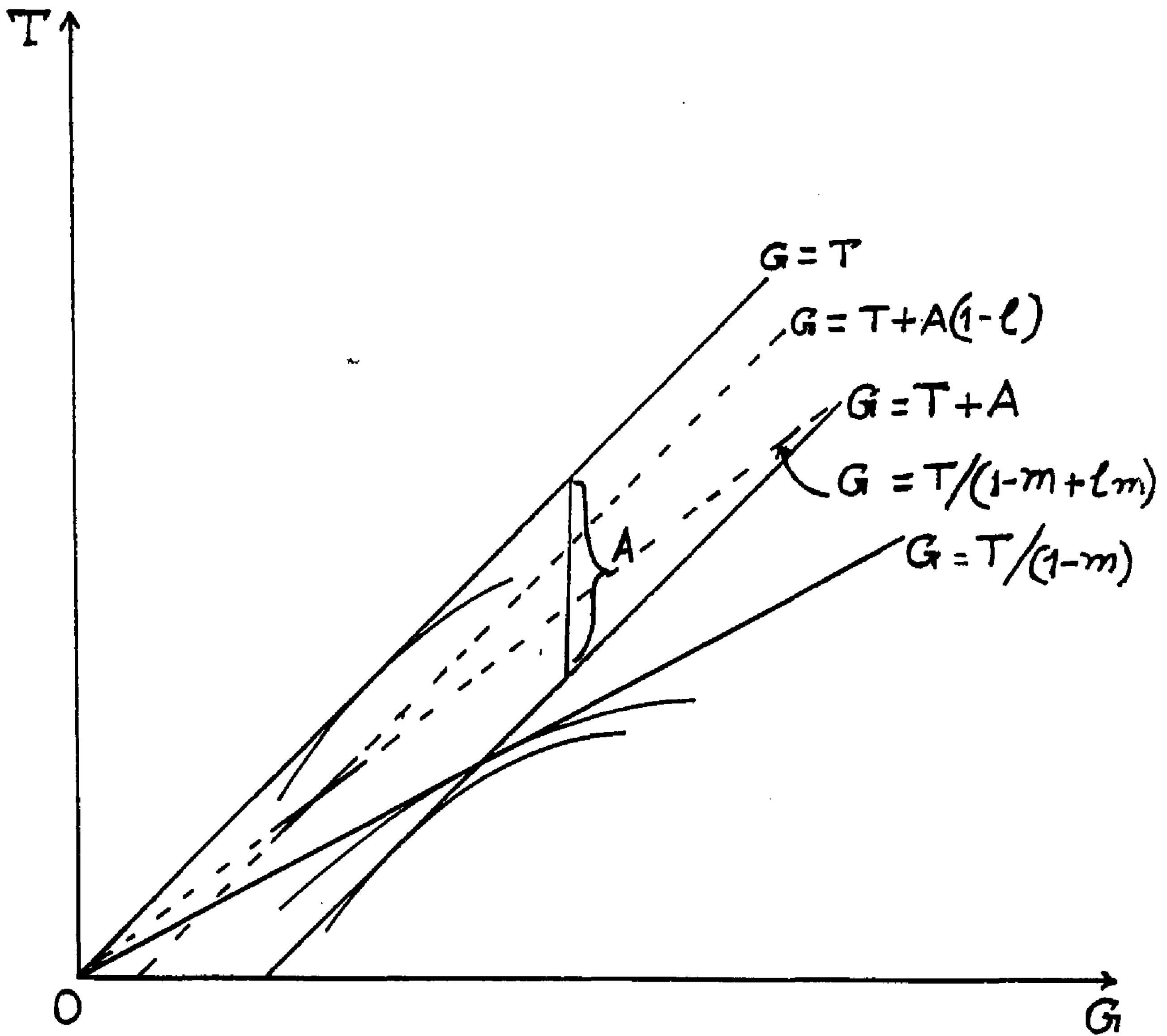

FIGURE-4

ADDED FEDERAL TAX-BURDEN IN THE TAX-BURDEN MODEL

This budget constraint has also been depicted in Figure 4, under the assumption that $\ell < 1$. Once again comparing the budget constraint in the absence of federal tax burden with the one with the tax burden, it is observed that the unconditional grant brings about offsetting shift in the community's budget constraint. In this case the weakening of the tax-effort effect is not difficult to see.

SUMMARY

The issue of federal grants has been discussed from a relatively "general setting". It is seen that the internalizing potentiality of benefit spillovers cannot be guaranteed unless the possibility of increased federal taxes are considered. The same is true for unconditional grants where income or tax-effort equalizing capability can be in question. This chapter has considered only one source of financing federal grants. The other possibilities as pointed out earlier in this chapter, like a concomitant reduction in other types of grants and/or federal expenditures and/or an increase in federal debts can also be shown to exert offsetting effects. It is the primary assertion of this thesis that an analysis of the program and welfare effects of federal grants in general should consider the financing aspect.

CHAPTER IV

SETTING UP THE HYPOTHESIS

Introduction

Few studies are available that exclusively analyse macro forces that cause state authorities to alter fiscal effort after the initiation of revenue sharing grant. The two most noteworthy studies by Gramlich and Galper[1], and Follian[2], have simply empirically investigated the effect of tax-effort, and found that revenue sharing in the U.S. did not relieve tax-effort of states. As already pointed out both these studies and almost all others have drawn conclusions from static micro theory of constrained utility maximization, and have obviously failed to take account of the inter and intra regional forces that interact in an economic environment that is totally dynamic. Hence empirical investigations that turned out to be inconsistent with theoretical conclusions, could not be given satisfactory explanations.

[1]Gramlich and Galper, "State and Local Fiscal Behavior and Federal Grant Policy."

[2]Follian, "Grant Impacts on Local Fiscal Behavior: Full Information Maximum Likelihood Estimates."

Intra-state Macroeconomic Interactions

In some ways a state's jurisdiction may be thought to posses all the sectors that an entire nation does; namely, private expenditures, government expenditures, and net exports (in the sense of net transfer of goods between states). However, being a part of the whole a state is not an independent economic entity either. It is faced with a federal budget that imposes certain federal taxes in lieu of federal expenditures, some of which are probably expended within the state's jurisdiction. If federal taxes are considered as a withdrawal, federal expenditures made within the jurisdiction may be considered as an injection of purchasing power. An increase or an initiation of federal revenue sharing which is simply one of the components of the federal budget implies simultaneously an increase/decrease in federal taxes/federal other expenditures. A recipient state is definitely favorably affected by whatever amount of revenue sharing grant it receives, but at the same time it is adversely affected by whatever increase in federal taxes and/or decrease in federal expenditures made within it's jurisdiction, due to the fact that the federal government must somehow finance the added

expenditures involved. From a macro sense the intensity of this adverse impact on the state's income due to federal tax surcharge and/or federal expenditure reduction, would be dependent on the marginal propensities of affected parties.

On the favorable side of the coin, the state receiving revenue sharing grant can use it with full discretion. It can use the money to reduce it's own tax collection, which is the basic objective of these grants, otherwise the money can be used for augmenting it's own expenditures. Whichever course or a misture of two is followed, there is a definite stimulative effect. For instance, if taxes are cut for individuals the extent of the stimulative effect on the region would depend atleast partially upon the marginal propensity of the affected group to consume locally.

Inter-state Migration:

Tiebout Effect

Back in 1956, Tiebout[1] hypothesised that spatial mobility of residents across local jurisdictions is a function of public goods and services

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[1] Charles Tiebout, "A Pure Theory of Local Expenditures," Journal of Political Economy, vol. LXIV (October,1956), pp. 416-424.

provided locally and the tax burden imposed locally. A change in the relative tax-expenditure mix in any local jurisdiction could then bring about changes in migrational patterns with profound consequences for affected states.[1] Gustely explicitly writes about these consequences in the following lines: "Focusing first on interregonial fiscal effects, grant programs that result in tax reductions for one region relative to another can have the effect of encouraging both businesses and individuals to alter locational decisions based upon these differences. The resulting migration could then produce the secondary result of expanding the business and residential tax base in the recipient region to the detriment of the other region. If increased expenditures result from the grant, the effect could be the same, with individuals and residents altering locations as a result of the grant, whereby affecting the tax base in each region."[2] The same logic of Gustely, would

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[1]Empirical evidence for the Tiebout hypothesis have been found in a number of studies; one such noteworthy study is by Paul Sommers and Daniel Suits, "Analysis of Net Interstate Migration'" Southern Economic Journal, vol. XL, no. 2 (October 1973), pp. 193-201.

[2]Richard Gustely, "Measuring the Regional Economic Impact on Federal Grant Programs," in Fiscal Crisis in American Cities, ed. Kenneth Hubbell (Cambridge, Mass.: Ballinger, 1979), pp. 70-71.

simply reverse direction if the state government reacts to federal grants by doing just the opposite.

Finalising the Hypothesis

A tax-effort coefficient (defined as the derivative of the state's income with respect to it's tax-effort) will be derived from an income-flow model that incorporates revenue sharing as an endogenous item (that is determined within the model with it's allocation formula).[1] The income-flow model will also include functions to capture intra-state economic factors, the Tiebout effect, and the possibility of a federal tax surcharge to finance the grant. The tax-effort coefficient derived in this way will be compared to the simple tax-effort coefficient in a no revenue sharing world.

It is maintained that if a state increases it's tax-effort after the introduction of revenue sharing, it will only do so if it is better off compared to a no-revenue sharing situation. The value of

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[1]The tax-effort coefficient is analogous to the balanced budget tax-rate multiplier, if the state imposes only one kind of tax. But from a realistic viewpoint, since there are different kinds of taxes, it is more appropriate to use the term tax-effort coefficient, which will also keep the analysis consistent with the literature on revenue sharing. In the model the tax-effort coefficient is the only available fiscal instrument in the discretion of the state.

the tax-effort coefficient with revenue sharing should then be greater than the tax-effort coefficient in a no-revenue sharing situation. Keeping other things constant, if in a no-grant situation there was no attempt at increasing tax-effort, it is maintained that a higher tax-effort coefficient is a necessary incentive towards that end. Otherwise, ofcourse revenue sharing could necessarily lead to a decrease in tax-effort which is the basic objective of such grants.

Prelude to an Income-Flow Model

One approach to explore regional macroeconomic impacts of federal grants is by the estimates of coefficients using large econometric models. But non-availability of data makes the construction of such regional models difficult. The only major economic series availabe on a state basis from the U.S. Department of Commerce is personal income. Most regional macro econometric models therefore have been constructed on the basis of product approach, specifically gross state product by industry. Without the consumption and investment sectors the structure of these models become "simply recursive, making it impossible to examine and account for important feedback and interactive effects contributing to the regional

economy's overall behavior."[1] Lathan, Lewis, and Landon in their study further note that, ". . . a model based on income accounts can produce useful information about such critical indicators as employment, incomes, and fiscal effects. We find that little of policy significance is added to the model by the existence of product accounts which provide estimates of the value of output produced by sector."[2]

The aim of this study is not to build a regional econometric model for forecasting purpose or to correctly estimate structural coefficients. Due to their immense size, coupled with the property that regional models are basically recursive, the impact coefficients even if derivable are not amenable to

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[1]Owen Hall and Joseph Licari, "Building Small Region Econometric Models: Extension of Glickman's Structure to Los Angeles," Journal of Regional Science, vol. XIV (December, 1974), p. 337. One of the original regional macro model using the product account recursive technique can be found in Norman Glickman, "An Econometric Forecasting Model for the Pliladelphia Region," Journal of Regional Science, vol. X (April 1971), pp. 15-32. There are a number of other regional models. A good survey is available in D. Chen, "A Tabular Survey of Selected Regional Econometric Models," Working Paper II, Federal Reserve Bank of San Francisco, 1972.

[2]W. R. Lathan, K. A. Lewis, and J. H. Landon, "Regional Econometric Models: Specification and Simulation of a Quarterly Alternative for Small Regions," Journal of Regional Science, vol. XIX (1979), p. 3.

theoretical analysis. As already pointed out a good deal of studies are available that estimate these impact coefficients. Works, eheoretically explaining the reasons for such outcomes are rare, perhaps none atleast from a macro context.

A simple bi-sectoral (private and public sectors) income-flow model will be constructed. The size of the model will be kept sufficiently small to allow derivation of a tax-effort coefficient that can be subjected to theoretical analysis. The research will proceed to derive the necessary conditions under which this tax-effort coefficient in a revenue sharing world can take a different value than the tax-effort coefficient in a no-revenue sharing world. An empirical investigation of these conditions for 48 states of the U.S. will follow. It is conjectured that such a comparative theoretical and empirical work from a purely macro context will give important insights about the fiscal effects of revenue sharing in the U.S.

Besides the non-availability of a state-wise time-series on Consumption and Investment, there are other data limitations that constrict a state's income-flow model. Firstly, until now there are no estimates of money in circulation on a state basis.

The unrestricted flow of money between states would probably make such an estimate useless. Without a monetary sector, the interest rate (assumed to be determined by monetary and real forces from a national context) for a regional model may be considered exogenous (that is determined outside of this model). But for this model the inclusion of such an exogenous variable is redundant because the sole aim here is not forecasting but analysing structural interactions. All exogenous terms will drop out any way in the process of derivation of the tax-effort coefficient. Secondly, there are no state-wise time-series available on the flow of goods and services between states. Therefore, this factor could bot be incorporated in the income-flow model under consideration.

CHAPTER V

REVENUE SHARING ALLOCATION PROCEDURE

The State and Local Fiscal Assistance Act of 1972

In accordance with the State and Local Fiscal Assistance Act of 1972 (P.L. 92-512), a total sum of slightly more than $32.2 billion was allocated as revenue sharing grant and distributed over a period covering January 1972 to December 1976 and divided into seven entitlement periods. The same Act provided for the establishment in the Treasury of the U.S. a trust fund solely for this purpose.

The 1976 Amendments (P.L. 94-488) to the Act of 1972 extended the revenue sharing program to September 30, 1980, to distribute another $25.5 billion in four entitlement periods.

The 1980 Amendments to the Act of 1972 (P.L. 96-604), extended the program from October 1, 1980 through September 30, 1983, at approximately the same level of funding for local governments as had been available under the 1976 Amendments. Payments to state governments are not authorized during entitlement period twelve, but may be authorizd in periods

thirteen and fourteen. The 1976 and the 1980 Amendments made no changes to the allocation formulas.[1]

Stages in the Allocation Procedure

The revenue sharing allocation procedure involves four distinct major stages:

Stage I: At the beginning of each entitlement period allocations for the state jurisdictions are computed using both the Senate and House formulas separately for each state. Whichever formula exhibits the higher quantum of grant is accepted for that state jurisdiction. The maximization procedure could result in a total sum of all states that exceeds the sum appropriated for that entitlement period. Therefore, a scaling down of the figures would be performed for each state by whatever uniform percentage was necessary to bring the total for all states to match with the sum appropriated.

Stage II: The next stage in the allocation procedure involves dividing the sum arrived for each state jurisdiction in Stage I into two parts, one-third to go directly to the state governments, the rest two-thirds now to be subjected to other allocation form-

[1] U.S., Department of the Treasury, Washington. D.C., The Annual Reports of the Office of Revenue Sharing.

ulas for distribution to local governments.

<u>Stage III</u>: The Senate allocation formula with the items appropriately translated (the state items now becoming the county's and the national items becoming the states) is used to figure out county allocations. The two-thirds of the funds to be distributed locally retained from Stage II is subjected to this computation.

<u>Stage IV</u>: In the fourth and final stage, the total sum allocated for each county area is now distributed to local governments. The following three final steps are involved: Firstly, each Indian tribe or Alaskan native village that has members residing in the county is allowed a share of the county area allocation equal to it's proportion of the total county population. Secondly, the remainder (the bulk of the grant) is divided among the local governments (county, township, and municipals), according to the respective amounts of nonschool tax revenue raised by those several types of governments. Thirdly, the respective local governments (now ofcourse only township and municipal) allocation is figured out by a distinct formula that gives equal weight to three factors-population, relative tax-effort, and relative income, each defined for a county area.

The State and Local Fiscal Assistance Act of 1972 and later amendments decide total nation-wide allocation, entitlement periods, and formulas governing jurisdictional allocation.

STAGE-I
State-wise division of each periods total entitlement.

STAGE-II
1/3 rd. of each state-wise allocation becomes the state government's share.

STAGE-III
2/3 rd. left for local allocation is now divided into county basis allocation.

STAGE-IV
Finally, the county-wise allocations are divided into local basis for distribution to local governments.

EXHIBIT SHOWING STAGES OF REVENUE SHARING ALLOCATION PROCEDURE

Simplification of the Senate and House Allocation Formulas

The income-flow model is to be constructed for a state jurisdiction and therefore the entire revenue sharing grant that remains within the jurisdiction of the state is relevant. The within state distribution procedure is therefore considered irrelevant for the model. Hence only the Senate and House formulas are incorporated with necessary simplifications.

The Senate Formula: In the Senate formula, the population of the state, the tax-effort of the state, and the inverse of the relative per-capita income of the state (relative to the entire country's per-capita income) have been incorporated in a multiplicative form, and the expression divided by the same for the entire country. Using notations, the allocation to the ith. state can be expressed as:

$$R_i = \left[\frac{P_i (T_i/Y_i) \left(\frac{M/P}{M_i/P_i} \right)}{\sum_{j=1}^{51} P_j (T_j/Y_j) \left(\frac{M/P}{M_j/P_j} \right)} \right] \times K$$

Where:

R_i = Revenue Sharing grant to state i.

$P_{i \text{ or } j}$ = Population of the ith. or jth. state, estimated by the Bureau of the Census.

$T_{i \text{ or } j}$ = State and Local taxes collected by the ith- or jth. state unit during the latest available fiscal year, as defined and reported by the Bureau of the Census on Government Finances.

$M_{i \text{ or } j}$ = Total money income received by all persons residing in the ith. or jth. state during the latest available calender year, defined and reported by the Bureau of the Census.

$Y_{i \text{ or } j}$ = Aggregate personal income of the ith. or jth. state during the latest available calender year, defined and reported by the Bureau of Economic Analysis of the Department of Commerce.

K = Total revenue sharing allocation for all states during an entitlement period.

M & P = The subscripts are dropped for these two notations to denote for the entire country.

Referring back to the Senate formula, it is observed that M/P is a constant that can be taken outside the parentheses and cancelled out. So that:

$$R_i = \left[\frac{M/P \left(\frac{P_i \cdot T_i / Y_i}{M_i / P_i} \right)}{M/P \sum_{j=1}^{51} \left(\frac{P_j \cdot T_j / Y_j}{M_j / P_j} \right)} \right] \times K = \left[\frac{\left(\frac{P_i^2 \cdot T_i}{Y_i \cdot M_i} \right)}{\sum_{j=1}^{51} \left(\frac{P_j^2 \cdot T_j}{Y_j \cdot M_j} \right)} \right] \times K$$

Now writing 'a' for $\sum_{j=1}^{51}\left(\frac{P_j^2 \cdot T_j}{Y_j \cdot M_j}\right)$, the expression reduces to:

$$R_i = \left[\frac{P_i^2 \cdot T_i}{Y_i \cdot M_i}\right] \times \frac{K}{a}$$

Continuing with the simplification procedure of the Senate formula, it is observed that the difference in the two income measures M_i (the state i's money income) and Y_i (the state i's personal income) can be ignored for analytical purpose. Since the income-flow model includes only personal income, M_i is replaced by Y_i. The Senate formula ultimately gets reduced to its final form as follows:

$$R_i = \left[\frac{P_i^2 \cdot T_i}{Y_i^2}\right] \times \frac{K}{a}$$

The Senate formula will be entered in this final form in the Income-flow model.

Using a weighted additive form, the House formula incorporates in addition to the three factors already discussed under the Senate version, two more factors namely; Urban Population, and Income Tax collections. Using notations, the allocation to ith.

state using the House formula can be expressed as:

$$R_i = \left[.22 \left\{ \frac{P_i}{P} + \frac{UP_i}{UP} + \frac{P_i \left(\frac{M/P}{M_i/P_i} \right)}{\sum_{j=1}^{51} P_j \left(\frac{M/P}{M_j/P_j} \right)} \right\} + .17 \left\{ \frac{T_i^2/Y_i}{\sum_{j=1}^{51} \left(\frac{T_j^2}{Y_j} \right)} + \frac{IT_i}{\sum_{j=1}^{51} IT_j} \right\} \right] \times K$$

The new additional terms in the House formula are:

UP_i = Urban Population of the ith. state, determined by the Bureau of the Census.

UP = Urban Population of the U.S., determined by the Bureau of the Census.

IT_i or j = Individual Income Taxes collected by the ith. or jth. state during the latest calender year, as reported by the Bureau of the Census.

The House formula is simplified and reduced in the same manner as the Senate formula. The term M/P appears in the House formula as well. It is taken common and cancelled out, and M_i is replaced by Y_i. In addition the following terms are observed to be constants, because they pertain to the entire country. Suitable notations are also assigned to these constants for future convenience.

Let:

P $= b_1$

UP $= b_2$

$$\sum_{j=1}^{51} P_j^2/M_j \qquad = b_3$$

$$\sum_{j=1}^{51} T_j^2/Y_j \qquad = b_4$$

$$\sum_{j=1}^{51} IT_j \qquad = b_5$$

With the sole objective of keeping the size of the model small, but with some loss in specification quality, it is assumed that; firstly, Urban Population of the state is a proportion of it's total population, and secondly, the state's Individual Income Tax collections is a proportion of it's total Tax collections. It is therefore written that:

$$UP_i = \gamma_{1i} \cdot P_i$$

Where, γ_1 and γ_2 are the factors of proportion of the ith. state.

$$IT_i = \gamma_{2i} \cdot T_i$$

After all the simplifications are performed, the House formula takes the following final form, which will be entered in the Income-flow model:

$$R_i = \left[.22 \left\{ \frac{P_i}{b_1} + \frac{\gamma_{1i} \cdot P_i}{b_2} + \frac{P_i^2/Y_i}{b_3} \right\} + .17 \left\{ \frac{T_i^2/Y_i}{b_4} + \frac{\gamma_{2i} \cdot T_i}{b_5} \right\} \right] \times K$$

CHAPTER VI

INCOME-FLOW MODEL

Notational Presentation

1. $GSE_i = g(Y_i) = C_i + G_i + GF_i$

2. $C_i = C(GSE_i - IT_i - F_i)$

3. $T_i = \tau_i Y_i$

4. $F_i + FO_i = \ell \times [R_i + GF_i]$

5. $G_i = T_i + R_i$

6a. $R_i = \left[P_i^2 \cdot T_i / Y_i^2\right] \times \frac{K}{a}$

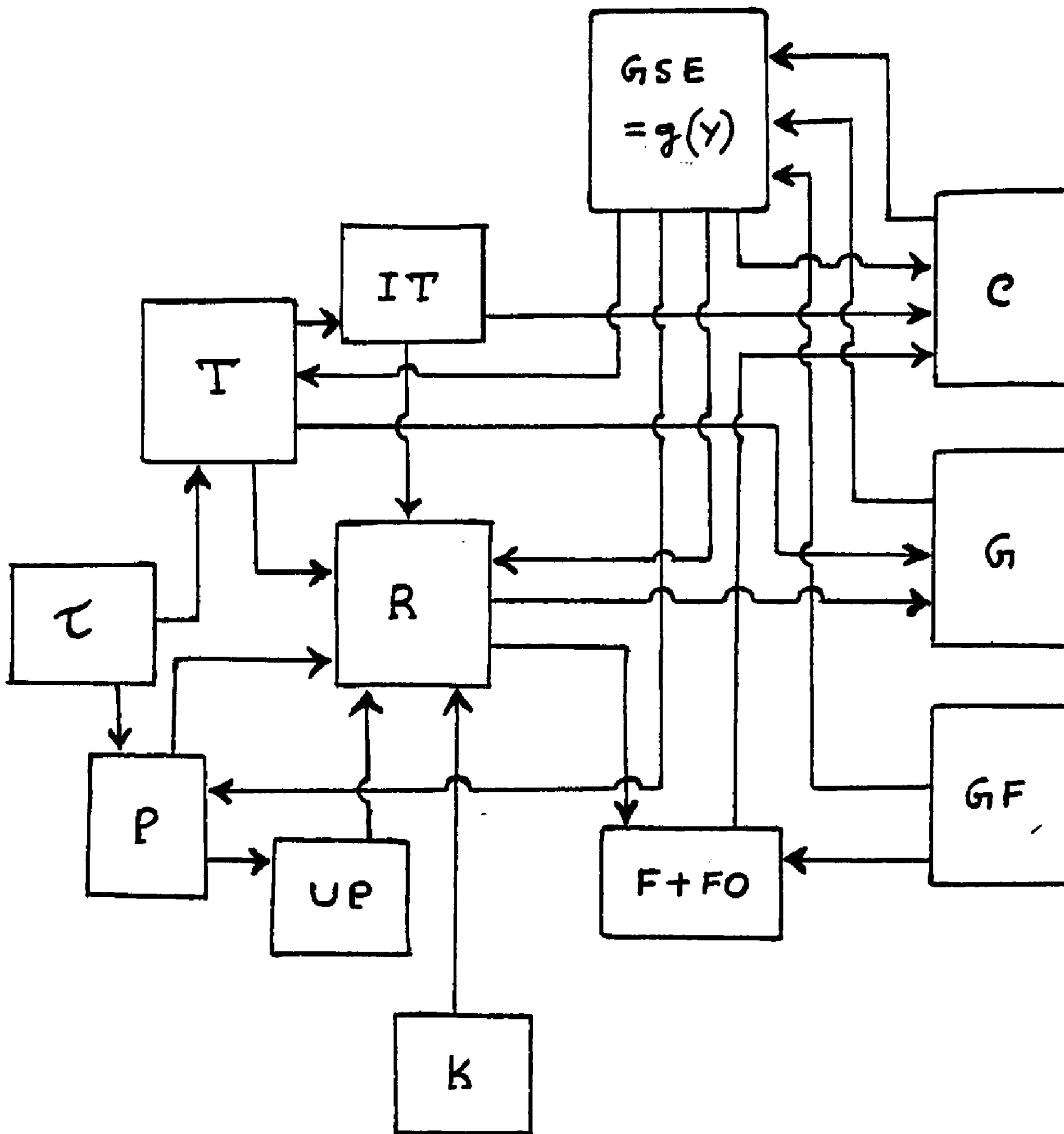
6b. $R_i = \left[.22\left\{\frac{P_i}{b_1} + \frac{UP_i}{b_2} + \frac{P_i^2/Y_i}{b_3}\right\} + .17\left\{\frac{T_i^2/Y_i}{b_4} + \frac{IT_i}{b_5}\right\}\right] \times K$

7. $\frac{P_i}{b_1} = P\left(\frac{Y_i - T_i}{P_i}\right)$

8. $UP_i = Y_{1i} P_i$

9. $IT_i = Y_{2i} T_i$

Equations 2 and 7, are the only truly behavioral functions. Also to be noted that for states that maximise its' revenue sharing by using the Senate formula, equation 6a is relevant. Other



BLOCK DIAGRAM OF THE INCOME FLOW MODEL

states that maximise its' revenue sharing grant by using the House formula, equation 6b is relevant. The rest of the equations are common for all states.

Definitions of Variables

Endogenous:

1. GSE_i = Gross state expenditures of state i.

2. Y_i = Personal income of state i.

3. C_i = Total private expenditures of state i.

4. G_i = State and local government expenditures of state i.

5. T_i = State and local taxes of state i, also defined earlier.

6. F_i = Federal income tax burden on state i.

7. R_i = Revenue sharing grant to state i, also defined earlier.

8. P_i = Population of state i, also defined earlier.

9. IT_i = State imposed income tax of state i, also defined earlier.

10. UP_i = Urban population of state i, also defined earlier.

Exogenous:

1. GF_i = Federal government expenditures made within the jurisdiction of state i. Also includes all federal transfers other than revenue sharing.

2. τ_i = Tax-effort of state i, considered as the only policy variable in the model.

3. FO_i = Federal government total revenue collections other than income-tax, from within the jurisdiction of state i.

The rest of the exogeneous variables have already been defined. They are not shown here once again to avoid repetition.

Description of Equations

1. $GSE_i = g(Y_i) = C_i + G_i + GF_i$

Here two separate equations have been joined together for analytical convenience, to be seen later. In the first part of the equation system, gross state product, which is theoretically equal to gross state expenditures (GSE_i) in equilibrium, is specified to be a function of the state's personal income (Y_i). In most small region econometric models value of output in some sectors are specified to be functions of personal income of the same sectors either directly or recursively. Being a two variable equation, it would definitely not seek to identify the demand or supply function. From an accounting sense it can at best be mentioned that personal income is a proportion of the state's aggregate expenditures.

In the second part of the equation system,

from the state's income accounting point of view, gross state expenditures (GSE_i) is stated equal to the sum of the state's private expenditures (C_i), public expenditures (G_i), and federal public expenditures made within the jurisdiction of the state (GF_i). Federal government expenditures made within the jurisdiction of the state (GF_i) generate income in the same way as does state government expenditutes (G_i), and should therefore necessarily be a part of gross state expenditures (GSE_i).

2. $C_i = C\left(GSE_i - IT_i - F_i\right), \quad \frac{\partial C\left(GSE_i - IT_i - F_i\right)}{\partial C} = C_y > 0.$

State private consumption expenditures (C_i) is simply specified to be an increasing function of the state's after tax gross state expenditures $\left(GSE_i - IT_i - F_i\right)$.

3. $T_i = \tau_i Y_i, \quad \tau_i > 0.$

State and local taxes (T_i) is specified to equal to the state's tax-effort (τ_i) times the state's personal income (Y_i). The tax-effort of the state (τ_i) is the only policy variable in the model.

4. $F_i + FO_i = \ell \times \left[R_i + GF_i\right]$

This function spells out whether the state gains or loses in the ultimate analysis as a result of all kinds of federal expenditures made within the

jurisdiction of the state and federal tax burden borne by the state. In the right hand side of the equation revenue sharing grant received (R_i), plus all other federal government expenditures (GF_i) equal total federal money finally spent within the state's jurisdiction, and are considered gains. On the other hand, all federal tax burden on the state ($F_i + FO_i$) is a loss item to the state. The factor 'ℓ' to be called the gain/loss factor therefore determines whether the state loses or gains from all kinds of federal budgetary transactions. If $\ell < 1$, the state is a net gainer, as it gives out less in federal taxes ($F_i + FO_i$) than what it receives ($R_i + GF_i$). The state is a net loser therefore if $\ell > 1$.

The objective of incorporating this function is to rekon the possibility that the introduction of revenue sharing could induce the federal government to raise more taxes to finance the additional expenditure. How would such a possibility significantly impede the desirable effects of federal grants have already been discussed with the use of the Conventional and the Tax-Burden model, in an earlier chapter.

5. $G_i = T_i + R_i$

As already pointed out a balanced budget would be assumed. In view of the actual budgetary

guidelines to be followed by state and local governments it is a realistic assumption.

6a. $R_i = \left[\frac{P_i^2 \cdot T_i}{Y_i} \right] \times \frac{K}{a}$

6b. $R_i = \left[.22 \left\{ \frac{P_i}{b_1} + \frac{UP_i}{b_2} + \frac{P_i^2 / Y_i}{b_3} \right\} + .17 \left\{ \frac{T_i^2 / Y_i}{b_4} + \frac{IT_i}{b_5} \right\} \right] \times K$

The derivation of the simplified Senate and House allocation formulas have already been presented in an earlier chapter.

7. $\frac{P_i}{b_1} = P\left(\frac{Y_i - T_i}{P_i} \right), \quad \frac{\partial P\left(\frac{Y_i - T_i}{P_i} \right)}{\partial P_i} = P_a > 0.$

This equation seeks to capture the Tiebout effect. Assuming that the natural growth of the population (growth due to the difference in the birth and death rate) is the same throughout the U.S., it is plausible to argue that if no inter-state migration take place, the ratio of a state's population to the U.S. should necessarily remain fixed. That is the population of any state divided by the total population of the U.S. (P_i/b_i) should remain unchanged. From the same promise it follows therefore that a change in this ratio (P_i/b_i) would only be brought about by inter-state migration. As already discussed the state's per-capita income and the state and locally imposed tax differential are the most significant factors determining such migratory behavior. Hence per-capita income after state and local taxes

is used as an explanatory factor for determining inter-state migration. Federal taxes are not deducted simply because it does not create any inter-state differential due to it's uniform rate structure. It is rational to assume that P_a takes a positive value.

8. $UP_i = \gamma_{1i} \cdot P_i$

Urban population of a state is assumed to be a fixed proportion of it's total population. Rationale already explained in Chapter V.

9. $IT_i = \gamma_{2i} \cdot T_i$

Income tax imposed by a state is assumed to be a fixed proportion of it's total taxes collected. Rationale of the inclusion of this equation already explained in Chapter V.

CHAPTER VII

TAX-EFFORT COEFFICIENT

Derivation[1]

In the Tiebout function, $\frac{P_i}{b_1} = P\left(\frac{Y_i - T_i}{P_i}\right)$ transferring the constant term b_1 and subsequent total differentiation yields:

$$dP = \frac{b_1 P_a \left(\frac{1-\tau}{P}\right)}{1 + b_1 P_a \left(\frac{Y-T}{P^2}\right)} dY - \frac{b_1 P_a Y/P}{1 + b_1 P_a \left(\frac{Y-T}{P^2}\right)} d\tau$$

The expression is further condensed to appear as:

$$dP = \alpha_1 dY + \alpha_2 d\tau$$

Where:

$$\alpha_1 = \frac{b_1 P_a \left(\frac{1-\tau}{P}\right)}{1 + b_1 P_a \left(\frac{Y-T}{P^2}\right)}$$

$$\alpha_2 = -\frac{b_1 P_a Y/P}{1 + b_1 P_a \left(\frac{Y-T}{P^2}\right)}$$

Since $\tau < 1$, and $P_a > 0$, we can say unambiguously that $\alpha_1 > 0$. On the same token, but now since there is a minus sign in fromt of the expression for α_2 we can say unambiguously that $\alpha_2 < 0$. Keeping everything else constant, if there is an increase in the state's income, it's population will increase due to

[1]Detailed derivation of the expressions are given in Appendix 2. Note also that from now on the subscript 'i' will be dropped for simplicity.

migratory effect by the factor α_1. α_2 on the other hand can simply be interpreted as the declining effect on the state's population due to an increase in the state's tax-effort.

Total differentiation of the Senate formula $R_i = \left[P_i^2 \cdot T_i / Y_i^2\right] \times \frac{K}{a}$, yields the following expression:

$$dR = \frac{K}{a}\left(\frac{2Y\tau P\alpha_1 - \tau P^2}{Y^2}\right)dY + \frac{K}{a}\left(\frac{P^2 + 2\tau P\alpha_2}{Y}\right)$$

which is further condensed to appear as:

$$dR = \beta_{S1}\,dY + \beta_{S2}\,d\tau$$

Where:

$$\beta_{S1} = \frac{K}{a}\left(\frac{2Y\tau P\alpha_1 - \tau P^2}{Y^2}\right)$$

$$\beta_{S2} = \frac{K}{a}\left(\frac{P^2 + 2\tau P\alpha_2}{Y}\right)$$

An increase in the state's income brings about an immediate negative effect on revenue sharing allocation given by the term $\frac{-\tau P^2}{Y^2}$, and a long-term positive effect on revenue sharing allocation via in-migration of population given by the term $\frac{2Y\tau P\alpha_1}{Y^2}$. An increase in the state's tax-effort on the other hand results in an immediate positive effect on revenue sharing allocation expressed by the term $\frac{P^2}{Y^2}$, and a long-term negative effect on revenue sharing allocation via out-migration of population espressed

by the term $\frac{2\tau P\alpha_2}{Y}$. The sign of β_{S1} and β_{S2} are indeterminate.

Total differentiation of the House formulaa

$$R_i = \left[\cdot 22 \left\{ \frac{P_i}{t_1} + \frac{UP_i}{t_2} + \frac{P_i^2/Y_i}{t_3} \right\} + \cdot 17 \left\{ \frac{T_i^2/Y_i}{t_4} + \frac{IT_i}{t_5} \right\} \right] \times K$$

yields the following expression:

$$dR = K\left[\cdot 22\left(\frac{\alpha_1}{t_1} + \frac{\alpha_2 \gamma_1}{t_2} + \frac{2YP\alpha_1 - P^2}{t_3 Y^2}\right) + \cdot 17\left(\frac{\tau^2}{t_4} + \frac{\tau\gamma_2}{t_5}\right)\right] dY +$$

$$K\left[\cdot 22\left(\frac{\alpha_2}{t_1} + \frac{\alpha_2 \gamma_1}{t_2} + \frac{2YP\alpha_2}{t_3 Y^2}\right) + \cdot 17\left(\frac{2Y\tau}{t_4} + \frac{Y\gamma_2}{t_5}\right)\right] d\tau$$

which is further condensed to appear as:

$$dR = \beta_{H1}\, dY + \beta_{H2}\, d\tau$$

Where:

β_{H1} is the associated term with dY, and

β_{H2} is the associated term with $d\tau$.

Once again β_{H1} is not unambiguously signed as it includes the immediate negative effect on revenue sharing allocation due to an increase in the state's income, and the long-term positive effect brought about by in-migration of population. Similarly, once again β_{H2} includes both positive and negative terms, due to an increase in the state's tax-effort. The

interpretations are exactly the same as in the Senate formula.

Since a state has the option to use either the Senate or House formula depending on which one maximises allocation, in an ex-post sense in one entitlement period only one particular formula is relevant. To remedy this problem of selection, for the theoretical part of the study, we will use the term β_1 to stand for either β_{S1} or β_{H1}, and the term β_2 to stand for either β_{S2} or β_{H2}. For the empirical work at a latter stage, the necessary adjustment for specificity can be made. Presently therefore we write: $dR = \beta_1 dY + \beta_2 d\tau$

Total differentiation of the private sector expenditure function $C_i = C\left(GSE_i - IT_i - F_i\right)$ yields:

$$dC = C_Y\left(g_Y - \gamma_2\tau - \ell\beta_1\right)dY - C_Y\left(\gamma_2 Y + \ell\beta_2\right)d\tau$$

Total differentiation of the government budget constraint $G_i = T_i + R_i$ yields:

$$dG = \left(\tau + \beta_1\right)dY + \left(Y + \beta_2\right)d\tau$$

Finally, total differentiation of the model closing identity yields:

$$g_Y dY = dC + dG$$

Replacing the expressions for dC and dG, and by suitable grouping of terms the final form of the

tax-effort coefficient is obtained:

$$\left.\frac{dY}{d\tau}\right|_R = \frac{Y(1-\gamma_2 C_Y) + \beta_2 (1-\ell C_Y)}{g_Y(1-C_Y) - \tau(1-\gamma_2 C_Y) - \beta_1(1-\ell C_Y)} \quad \cdots\cdots\cdots 10$$

The simple tax-effort coefficient, i.e., without revenue sharing takes the following form:

$$\left.\frac{dY}{d\tau}\right|_S = \frac{Y(1-\gamma_2 C_Y)}{g_Y(1-C_Y) - \tau(1-\gamma_2 C_Y)} \quad \cdots\cdots\cdots 11$$

<u>Comparison of the Tax-effort Coefficients</u>

The objective now is to sort out the conditions when $\left.\frac{dY}{d\tau}\right|_R > \left.\frac{dY}{d\tau}\right|_S$. Under the circumstance, the state has an incentive to increase it's tax-effort after the introduction of revenue sharing. For easy interpretation and identification of these conditions further condensation of terms is made.

Let:

$$Y(1-\gamma_2 C_Y) = M$$

$$g_Y(1-C_Y) - \tau(1-\gamma_2 C_Y) = N$$

$$(1-\ell C_Y) = Q$$

The tax-effort coefficient expression 10 can there-for be written as:

$$\left.\frac{dY}{d\tau}\right|_R = \frac{M+\beta_2 Q}{N-\beta_1 Q}$$

and the tax-effort coefficient expression 11 can be written as:

$$\left.\frac{dY}{d\tau}\right|_S = \frac{M}{N}$$

<u>Economic interpretation of β_1, β_2, and Q</u>:

$\beta_1 > 0$ or < 0, if an increase in the state's personal income results in an increase/decrease in revenue sharing allocation after considering both the immediate and long-term effects.

$\beta_2 > 0$ or < 0, if an increase in the state's tax-effort results in an increase/decrease in revenue sharing allocation after considering both the immediate and long-term effects.

For both β_1 and β_2 the immediate effect as already explained in an earlier chapter is the one due directly to the revenue sharing allocation formula, and the long-term effect refers to the revenue sharing allocation effect by population change which in turn is affected by migration.

Last of all if, $Q > 0$, i.e., if $(1-\ell C_y) > 0$, then $\ell < \frac{1}{C_y}$. Assuming that C_y is very close to unity, the state either wins or loses very slightly out of a revenue sharing grant coupled with the federal tax burden. For simplicity we will assume that if $Q>0$, the state is a net winner. From the same token if $Q<0$, i.e., $\ell > \frac{1}{C_y}$, we will say with certainty the state is a net loser.

The following is a scenario of conditions under which

<u>Possibility A</u>:

Observing expressions 10 and 11 , it can be said that if either:

a. $\beta_2 > 0$, $-\beta_1 > 0$, $Q > 0$ is true, or

$\beta_2 < 0$, $-\beta_1 < 0$, $Q < 0$ is true, then

$\left.\frac{dY}{d\tau}\right|_R$ will be $> \left.\frac{dY}{d\tau}\right|_S$ if further,

$\frac{M+\beta_2 Q}{N-\beta_1 Q} > \frac{M}{N}$ or,

$M+\beta_2 Q > \frac{M}{N}(N-\beta_1 Q)$ or,

$\frac{\beta_2}{-\beta_1} > \frac{M}{N}$

Possibility B:

If either:

$\beta_2 > 0, -\beta_1 > 0, Q < 0$ is true, or
$\beta_2 < 0, -\beta_1 < 0, Q > 0$ is true, then

$\left.\frac{dY}{d\tau}\right|_R$ will be $> \left.\frac{dY}{d\tau}\right|_S$ if further,

$$\frac{M+\beta_2 Q}{N-\beta_1 Q} > \frac{M}{N} \quad \text{or,}$$

$$M+\beta_2 Q > \frac{M}{N}\left(N-\beta_1 Q\right) \quad \text{or,}$$

$$\frac{\beta_2}{-\beta_1} < \frac{M}{N}$$

The sign of the inequality changes because, $\beta_2 Q < 0$ and $-\beta_1 Q < 0$.

Possibility C:

If either:

$\beta_2 > 0, -\beta_1 < 0, Q > 0$ is true, or
$\beta_2 < 0, -\beta_1 > 0, Q < 0$ is true, then without further conditions,

$\left.\frac{dY}{d\tau}\right|_R > \left.\frac{dY}{d\tau}\right|_S$. Because it must be true that,

$$\frac{M+\beta_2 Q}{N-\beta_1 Q} > \frac{M}{N} \quad \text{when } \beta_2 Q > 0 \text{ and } -\beta_1 Q < 0$$

Possibility D:

If either:

$\beta_2 > 0, -\beta_1 < 0, Q < 0$ is true, or

$\beta_2 < 0, -\beta_1 > 0, Q > 0$ is true, then without

further conditions,

$\frac{dY}{d\tau}_R < \frac{dY}{d\tau}_S$. Because it must be true that,

$$\frac{M + \beta_2 Q}{M - \beta_1 Q} < \frac{M}{N} \quad \text{when} \quad \beta_2 Q < 0 \text{ and } -\beta_1 Q > 0$$

CHAPTER VIII

EMPIRICAL FINDINGS

Introduction

The objective for the empirical part of the study is to identify the Possibility Condition (derived in chapter VII) satisfied for each state in the U.S. This will enable us to know not only whether a state's tax-effort will be lowered after the introduction of revenue sharing or not, but also by examining the Possibility Condition satisfied, the underlying economic reasons will be unfolded too.

Each individual state except Alaska, Hawaii, and Washington D.C. will be tested to determine Possibility Condition.[1] For states that satisfy Possibility Condition 'C' or 'D', estimates of β_1, β_2, and Q are sufficient. However, for the rest of the states satisfying Possibility Conditions 'A' or 'B', estimates of $\frac{M}{N}$ are also necessary.

The different estimates that are required to determine the Possibility Conditions are repeated once again for ready reference:

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[1]Alaska, Hawaii, and Washington D.C. have been excluded to retain geographical contiguity and status.

$$\beta_{S1} = \frac{K}{a}\left(\frac{2\cdot Y\cdot \tau\cdot P\cdot \alpha_1 - \tau\cdot P^2}{Y^2}\right)$$

$$\beta_{S2} = \frac{K}{a}\left(\frac{P^2 + 2\cdot \tau\cdot P\cdot \alpha_2}{Y}\right)$$

$$\beta_{H1} = K\left[\cdot 22\left(\frac{\alpha_1}{b_1} + \frac{\alpha_1\cdot \tau_1}{b_2} + \frac{2\cdot Y\cdot P\cdot \alpha_1 - P^2}{b_3\cdot Y^2}\right) - \cdot 17\left(\frac{\tau^2}{b_4} + \frac{\tau\cdot \tau_2}{b_5}\right)\right]$$

$$\beta_{H2} = K\left[\cdot 22\left(\frac{\alpha_2}{b_1} + \frac{\alpha_2\cdot \tau_2}{b_2} + \frac{2\cdot Y\cdot P\cdot \alpha_2}{b_3\cdot Y^2}\right) + \cdot 17\left(\frac{2\cdot Y\cdot \tau}{b_4} + \frac{Y\cdot \tau_2}{b_5}\right)\right]$$

Where:

$$\alpha_1 = \frac{b_1\cdot \rho_a\left(\frac{1-\tau}{P}\right)}{1 + b_1\cdot \rho_a\left(\frac{Y-T}{P^2}\right)}$$

$$\alpha_2 = \frac{b_1\cdot \rho_a\cdot Y/P}{1 + b_1\cdot \rho_a\left(\frac{Y-T}{P^2}\right)}$$

$$Q = \left(1 - \ell C_Y\right)$$

$$\frac{M}{N} = \frac{Y\left(1 - \tau_2\cdot C_Y\right)}{g_Y\left(1 - C_Y\right) - \tau\left(1 - \tau_2\cdot C_Y\right)}$$

The following are presented also:

$C_Y = \frac{\partial C\left(GSE - IT - F\right)}{\partial C}$, the marginal propensity out of total private consumption.

$\rho_a = \frac{\partial P\left(\frac{Y-T}{P}\right)}{\partial P}$, the Tiebout coefficient.

$\ell = \frac{F + FO}{R + GF}$, tax-spending ratio whoch is also called the gain/loss factor.

$g_Y = \frac{\partial g(Y)}{\partial GSE}$, coefficient determining how gross state expenditure is related to personal income.

$r_1 = \frac{UP}{P}$, the ratio of urban population to total population of the state.

$r_2 = \frac{IT}{T}$, the ratio of income tax to total tax of the state.

Estimated Results

The computations required to test the Possibility Conditions include the estimation of coefficients, ratios, and parameters. The behavioral coefficients C_Y and P_a would be estimated by Ordinary Least Squares technique. The estimates of the ratios and the rest of the parameters would be based on state-by-state computation for the relevant year. Time-series data of all the variables were obtained from the 'Statistical Abstracts', a U.S. government publication.

Private Consumption Expenditure Function:

As already mentioned total private consumption expenditure data are not available on a state basis. It would be assumed therefore that the marginal propensity out of total private consumption expendi-

tures is the same for all states throughout the U.S. Ordinary Least Squares estimate of the private consumption expenditure function for the U.S., for the period 1960-1978 gives the following result:

$$C = -162.93 + 0.87 \left(GSE - \sum_{i=1}^{51} IT_i - \sum_{i=1}^{51} F_i\right)$$

(0.85) (47.85)

In parentheses are the 't' ratios.

$R^2 = 0.99$

D.W. = 1.72

<u>Tiebout Function</u>:

The Tiebout function has been estimated by cross-sectional Ordinary Least Squares estimate for the year 1972, simply because the tax-effort coefficient would be estimated for the same year. The following result has been obtained:

$$P/b = -0.04 + .0000258 \left(Y_i - T_i\right)/P_i$$

(2.33) (3.49)

In parentheses are the 't' ratios.

$R^2 = 0.21$

Taking 'b' which is the 1972 population estimate of the U.S., to the right hand side of the equation, the required value of the coefficient turns out to be = 5255.75. The coefficient is extremely significant suggesting that population differences between states is due to after state tax per-capita personal

income differentials.

Gain/Loss Factor:

Reciprocal estimates of the gain/loss parameter 'ℓ' have been computed and published by the U.S. Government Research Corporation, Washington D.C., under the title 'spending-taxes' ratio.[1] The 1975 estimates have been considered for this study. Estimates of 'ℓ' range from 0.51 for the state of New Mexico to 1.53 for the state of Mishigan. A full list of the estimates of 'ℓ' is provided in Appendix III. From the values of the marginal propensity out of total private consumption expenditures and the gain/loss parameter it is now possible to calculate 'Q' and thus determine its' sign for all the states individually.

Gross State Expenditure Coefficient:

Estimates of gross state expenditures are not available, making it impossible to estimate the required coefficient for each individual state. Hence gross national product has been regressed on personal income for the U.S., covering the period 1960-1978. The national estimate of 'g_y' will simply be borrowed

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[1]Government Research Corporation, Washington D.C., National Journal, June 26, 1976 and July 2, 1977.

and used for all the states under study. The result obtained is as follows:

$$GNP = 182.00 + 1.22(Y)$$
$$(3.28) \quad (205.47)$$

In parentheses are the 't' ratios.

$R^2 = 0.99$

D.W. = 0.79

Determination of Possibility Conditions

As already pointed out the first entitlement period of the revenue sharing allocation would be used for empirical findings. The actual data set used for calculation of allocation were supplied by the Office of Revenue Sharing, Washington D.C. For the 51 states ready made data on population, urban population, per-capita income, state and local taxes, tax-effort, and state income taxes were provided.

The heavy arithmetic manipulations and calcu-lat'α', β_1, β_2 'ere required to arrive at the values of 'α', β_1, β_2, and $\frac{M}{N}$ were done with the aid of 'Time Series' computer package.

States under the Senate Formula:

Thirty states have used the Senate allocation formula for the first entitlement period (1972) to

maximise their revenue sharing grant. Appendix III shows the calculations of 'α', β_{S1} , and β_{S2} for all these states, and also as a result whether the tax-effort coefficient with revenue sharing is greater or less than the simple tax-effort coefficient.

Looking at the Table-2 in Appendix III for twenty-six of the states under the Senate formula Possibility Condition-C is satisfied. For all these states there is a definite incentive to increase tax-efforts after the introduction of revenue sharing. All these states are net winners $(\alpha > 0)$ as per definition, in their revenue-expenditure transaction with the federal government. In addition their revenue sharing allocation is directly related to both their tax-efforts and personal income. This is observed from Table-2, Appendix III, as $\beta_{S1} > 0$ and $\beta_{S2} > 0$. Without further conditions all these states have an incentive to increase their tax-efforts after the introduction of revenue sharing, because for these states the post revenue sharing tax-effort coefficient is higher than the pre revenue sharing tax-effort coefficient. For these states then, the very objective of revenue sharing i.e., to relieve fiscal-stress (lowering of tax-effort) would probably not be achieved.

The rest of the four states under the Senate formula, satisfy Possibility Condition-D. These states are net losers $(\theta < 0)$ in their revenue-expenditure transaction with the federal government. Hence, although their revenue sharing allocation are directly related to both their tax-efforts and personal income, the added federal tax burden produces a situation where their post revenue sharing tax-effort coefficient is smaller than the pre revenue sharing tax-effort coefficient. For these states there is a good probability of relief of fiscal stress (lowering of tax-effort) after the introduction of revenue sharing.

States under the House Formula:

Referring to Table-3 and Table-4 in Appendix III, it is seen that eighteen states have used the House allocation formula for the first entitlemenet period to maximise their revenue sharing. Out of the eighteen states Possibility Condition-C is satisfied for California and New York only. These two states therefore have an incentive to increase tax-effort after the introduction of revenue sharing.

Referring to Table-3, for six of the states Possibility Condition-D is satisfied, indicating that they do not have an incentive to augment tax-effort after the introduction of revenue sharing. The econo-

mic interpretation would follow exactly the lines of the four other states that satisfy the same Possibility Condition under the Senate formula. For these six states under the House formula the probability of revenue sharing to bring about a relief in fiscal stress exist.

For the rest ten states under the House formula either Possibility Condition-A or B is satisfied requiring additional conditions as shown in Table-4, Appendix III. These additional conditions seek to weigh the values of $\frac{\beta_{H2}}{-\beta_{H1}}$ and $\frac{M}{N}$. It is observed that for eight of these states Possibility Condition-B is satisfied. All these states are net winners in their revenue-expenditure transaction with the federal government. Their revenue sharing grants are directly related to tax-effort and inversely related to personal income. In addition, for all these eight states $\frac{\beta_{H2}}{-\beta_{H1}}$ is $< \frac{M}{N}$. Therefore, for these states post revenue sharing tax-effort coefficient is greater than the pre revenue sharing tax-effort coefficient, indicating that these states would probably be better off by increasing tax-effort after the introduction of revenue sharing.

From the same table, for Missouri only,

TABLE I

BENEFITTED STATES AND THEIR TAX-EFFORTS

States that would benefit by lowering tax-effort after the introduction of revenue sharing.	Ranking of tax-effort: the higher the number the higher the tax-effort.
Delaware	23
Illinois	21
Indiana	15
Iowa	30
Michigan	28
Minnesota	39
Missouri	5
Nebraska	24
New Jersey	17
Ohio	1
Wisconsin	46

Possibility Condition-B is satisfied, but $\frac{\beta_{H2}}{-\beta_{H1}} > \frac{M}{N}$
Therefore for this state the post revenue sharing tax-effort coefficient is less than the pre revenue sharing tax-effort coefficient; suggesting that Missouri has no incentive to increase it's tax-effort after the introduction of revenue sharing.

Pennsylvania exhibits a unique situation with $Q = 0$. In such a situation the post and pre revenue sharing coefficient are the same.

Concluding Remarks

The empirical estimates of tax-effort coefficients show that out of forty-eight states considered in this study, thirty-six of them exhibit distinct incentive to increase tax-effort after the introduction of revenue sharing. This is separately shown in Table 1. Only eleven states have no incentive to increase tax-effort after the introduction of revenue sharing. Although, the noble objective of revenue sharing in relieving tax-effort might be achieved for these states, looking at Table 5, few of these states rank high in terms of fiscal stress. Most of all Ohio, which exhibits the lowest tax-effort, is one of the states that seem to benefit by lowering it's tax-effort after the introduction of revenue sharing. Table 5,

exhibits no correlation between these eleven states and high tax-effort. It seems therefore that most high tax-effort states would not be relieved from fiscal stress after the introduction of revenue sharing.

The above mentioned empirical findings surprisingly match with the often cited work done by Nathan, Manvel, and Calkins[1]. Using budget data, reports on the uses of revenue sharing issued by the sample jurisdictions, other reports and articles, and interviews with state and local public officials and interest-group leaders; the authors assessed the fiscal effects of revenue sharing up to July 1, 1973. Out of the nine categories of fiscal effects which they analysed, only 13.2% of total revenue sharing grants appropriated up to July 1, 1973, was used directly for tax reduction, and three-quarters of that is attributable to the state of Calfornia alone.

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[1]Nathan, Manvel, and Calkins, Monitoring Revenue Sharing.

CONCLUSION

The results unquestionably point out to the fact that it would be very difficult to exactly predict how any state's tax-effort would behave after revenue sharing is introduced, particularly in the form as it is in the United States. As seen the difficulty arises due to a number of factors most of which have been incorporated or touched upon in this study. These are; firstly the intricate inter and intra state macro economic interactions that would naturally have to be considered by a state deciding to change its tax-effort; secondly, the state federal tax-expenditure relationship which is the federal tax surcharge due to the initiation of a federal program (in this case, federal revenue sharing); and finally, the inclusion of tax-effort as a federal revenue sharing determining factor makes the matter even more complicated.

It is clear from this study that a partial equilibrium model concentrating on one or a few aspects of micro behavior is inadequate to deal with this issue, although such studies are theoretically sound with their own restricted world and in most

cases point to clear cut conclusions. This study proceeded by exploring and developing the micro foundations of federal grants, and then attempted to build a small income-flow model that incorporated economic interactions that are of importance to state-local policy makers.

The model presented definitely has a number of weak points, some of which may be major. Firstly, the model is a highly aggregative one with very few behavioral equations. The predictable power of such a model is obviously subject to criticism. Secondly, a federal tax surcharge is assumed to exist for all states and further that the revenue sharing grant would propell such a surcharge determined exactly by the surcharge coefficient 'l'. The existence of such a rigid fiscal relationship between the federal and state level can be questioned. In other words the gain/loss factor may in turn be affected by federal grants itself or other factors not considered. Thirdly, the model did not consider any lagged variable. Studies show that fiscal reactions of states and local governments due to federal grants may be significantly sluggish. Lastly, the income-flow model did not incorporate the fact that in the U.S.,

federal income tax system allows taxes paid to the state as deductibles. Hence, in the model the federal tax burden due to revenue sharing would be slightly overestimated. The incorporation of state taxes as deductibles would make the model more complex, and has therefore been avoided.

Inspite of these drawbacks the model has one very important insight to offer, and that is, in the popular partial-equilibrium theory of federal grants inter and intra macro economic forces have been ignored, whereas the theoretical exposition made in this study proves that such factors could be significant. The empirical part of this study points to the same direction. So far as that is validated to a lesser or larger degree the theory of grants need to be looked at from a much broader perspective.

To reiterate, the tax-effort effect of revenue sharing remains to be further explored from a macro context. This study attempted to show that such studies are worth undertaking. Revenue sharing grant in the U.S. was introduced only about 9 years back. A consensus using econometric estimation of tax-effort effect would probably be reached after a reasonable amount of time-series data are available

for which researchers would simply have to wait. But until then it would be naive to predict that states will react by lowering their tax-effort after they start receiving revenue sharing grants.

The present administration has already proposed to eventually fade out revenue sharing and also many other kinds of categorical matching grants, and instead initiate a comprehensive Block Grant Program, that will give a wider program latitude to the 51 states in comparison to the present categorical matching grants. Although money for general revenue sharing has been appropriated upto 1985, in the face of the President's proposed comprehensive Block Grant Program, an extension of it beyond 1985 seems unlikely. Federal revenue sharing as it evolved through a lot of controversy, would then also be eliminated in a similar manner. As can be concluded from this study the disgrace if any it has to bear is not due to the theory or rationale behind an unconditional grant, but much of the blame should fall on the allocation procedure under which these grants were distributed. Unconditional grants would probably still remain a favorite among the economists as effective income equalizers across sub-national jurisdiction, assuming that a less distortionary allocation procedure is adopted.

APPENDIX I

Derivation of Budget Constraints in the Tax-Burden model

Assuming a no-saving world, budget constraints without Grants-in-Aid can be written as either:

$Y = X+T$, or

$Y = X+G$

Eliminating Y and X, we get:

$G = T$

Budget constraints with categorical grants can be written as either:

$Y = X+T$, or

$Y+mG = X+G$, where 'm' is the categorical matching factor.

Eliminating Y and X, in this case we get the budget constraint with categorical grant. It simply becomes:

$G = T/(1-m)$

Budget constraints with unconditional grants can be written as either:

$Y = X+T$, or

$Y+A = X+G$, where 'A' is the amount of unconditional grant.

Eliminating Y and X produces the budget constraint with unconditional grant.

$G = T+A$

To derive the budget constraints in the face of federal tax burden, we simply incorporate the added equation that $F = \ell mG$ (in the case of categorical grant) and $F = \ell A$ (in the case of unconditional

grant). This produces:

$Y-F+mG = X+G$, for the categorical grant case, and

$Y-F+A = X+G$, for the unconditional grant case.

Eliminating Y and X, by using their counterpart equations the tax-burden budget constraints are easily derived as:

$G = T/(1-m-\ell m)$, for categorical grants, and

$G = T+A(1-\ell)$, for unconditional grants.

APPENDIX II

Derivation of Tax-Effort Coefficients

From the Tiebout function, which is equation no. 7 in the income-flow model, total differentiation yields:

$$\therefore \quad dP = b_1 \cdot P_a \cdot d\left(\frac{Y-T}{P}\right) \qquad \because \; P_a = \frac{\partial P\left(\frac{Y-T}{P}\right)}{\partial P} > 0$$

$$\text{or,} \quad dP = b_1 \cdot P_a \left[\frac{P\,d(Y-T) - (Y-T)\,dP}{P^2}\right]$$

$$\text{or,} \quad dP = b_1 \cdot P_a \left[\frac{P(dY - \tau dY - Y d\tau) - (Y-T)\,dP}{P^2}\right] \qquad T = \tau Y \quad \therefore dT = \tau dY + Y d\tau$$

$$\text{or,} \quad dP + \frac{b_1 \cdot P_a (Y-T)\,dP}{P^2} = b_1 P_a \left[\frac{dY - \tau dY - Y d\tau}{P}\right]$$

$$\text{or,} \quad dP\left(1 + \frac{b_1 \cdot P_a (Y-T)}{P^2}\right) = b_1 P_a (1-\tau)\,dY - \frac{b_1 \cdot P_a \cdot Y}{P}\,d\tau$$

$$\therefore \quad dP = \frac{b_1 \cdot P_a \left(\frac{1-\tau}{P}\right)}{1 + b_1 P_a \left(\frac{Y-T}{P^2}\right)}\,dY - \frac{b_1 \cdot P_a \cdot Y/P}{1 + b_1 P_a \left(\frac{Y-T}{P^2}\right)}\,d\tau$$

From the Senate formula, which is equation no. 6a in the income flow model, similarly we get:

$$R = \left[\frac{P^2 \tau}{Y}\right] \cdot \frac{K}{a}, \text{ because in eq. 3, } T_i = \tau_i \cdot Y_i$$

$$\therefore \quad dR = \left[\frac{Y d(P^2 \cdot \tau) - P^2 \tau\,dY}{Y^2}\right] \cdot \frac{K}{a}$$

$$\text{or,} \quad dR = \left[\frac{Y(P^2 \cdot d\tau + 2 \cdot \tau \cdot P \cdot dP) - \tau \cdot P^2 \cdot dY}{Y^2}\right] \cdot \frac{K}{a}$$

$$\text{or,} \quad dR = \left[\frac{Y\{P^2 \cdot d\tau + 2 \cdot \tau \cdot P(\alpha_1 \cdot dY + \alpha_2 \cdot d\tau)\} - \tau \cdot P^2 \cdot dY}{Y^2}\right] \cdot \frac{K}{a}$$

$$\text{or,} \quad dR = \frac{K}{a}\left(\frac{2 \cdot Y \cdot \tau \cdot P \cdot \alpha_1 - \tau \cdot P^2}{Y^2}\right) dY + \frac{K}{a}\left(\frac{P^2 + 2 \cdot \tau \cdot P \cdot \alpha_2}{Y}\right) d\tau$$

The House formula, which is equation. 6b, is a rather long expression. Total differentiation is performed in a part by part fashion.

$$dR = \left[\cdot 22 \left\{ \frac{dP}{b_1} + \frac{\gamma_1 \cdot dP}{b_2} + \frac{d(P^2/Y)}{b_3} \right\} + \cdot 17 \left\{ \frac{d(T^2/Y)}{b_4} + \frac{\gamma_2 \cdot dT}{b_5} \right\} \right] \cdot K$$

Now, taking each term in the bracket one by one we get:

$$\frac{\cdot 22}{b_1} dP = \frac{\cdot 22}{b_1} \left(\alpha_1 \cdot dY + \alpha_2 \cdot d\tau \right)$$

$$\frac{\cdot 22 \gamma_1}{b_2} dP = \frac{\cdot 22 \gamma_1}{b_2} \left(\alpha_1 dY + \alpha_2 \cdot d\tau \right)$$

$$\frac{\cdot 22}{b_3} d\left(P^2/Y\right) = \frac{\cdot 22}{b_3} \left[\frac{Y \cdot 2 \cdot P \cdot dP - P^2 \cdot dY}{Y^2} \right]$$

or, $$\frac{\cdot 22}{b_3} d\left(P^2/Y\right) = \frac{\cdot 22}{b_3} \left[\left(\frac{2 \cdot Y \cdot P \cdot \alpha_1 - P^2}{Y^2} \right) dY + \left(\frac{2 \cdot Y \cdot P \cdot \alpha_2}{Y^2} \right) d\tau \right.$$

$$\frac{\cdot 17}{b_4} d\left(T^2/Y\right) = \frac{\cdot 17}{b_4} d\left(\frac{\tau^2 \cdot Y^2}{Y} \right)$$

or, $$\frac{\cdot 17}{b_4} d\left(T^2/Y\right) = \frac{\cdot 17}{b_4} \left(\tau^2 dY + 2 \cdot Y \cdot \tau \cdot d\tau \right)$$

$$\frac{\cdot 17 \gamma_2}{b_5} dT = \frac{\cdot 17 \gamma_2}{b_5} \left(\tau \cdot dY + Y \cdot d\tau \right)$$

By final arrangement:

$$dR = K \left[\cdot 22 \left(\frac{\alpha_1}{b_1} + \frac{\alpha_1 \gamma_1}{b_2} + \frac{2 \cdot Y \cdot P \cdot \alpha_1 - P^2}{b_3 \cdot Y^2} \right) + \cdot 17 \left(\frac{\tau^2}{b_4} + \frac{\tau \cdot \gamma_2}{b_5} \right) \right] dY$$

$$+ K \left[\cdot 22 \left(\frac{\alpha_2}{b_1} + \frac{\alpha_2 \gamma_1}{b_2} + \frac{2 \cdot Y \cdot P \cdot \alpha_2}{b_3 \cdot Y^2} \right) + \cdot 17 \left(\frac{2 \cdot Y \cdot \tau}{b_4} + \frac{Y \cdot \gamma_2}{b_5} \right) \right] d\tau$$

Differentiation of the private sector expenditure function, which is equation no. 2, produces:

$$dC = C_Y\left[dg(Y) - dIT - dF\right]$$

or, $$dC = C_Y\left[g_Y \cdot dY - \gamma_2 \cdot \tau \cdot dY - \gamma_2 \cdot Y \cdot d\tau - dF\right]$$

Where we define:

$$\frac{\partial C(GSE-T-F)}{\partial C} = C_Y$$

$$\frac{\partial g(Y)}{\partial GSE} = g_Y$$

In the federal tax burden equation, *FO* and GF are exogenous terms. Result of differentiation is:

$$dF = \ell dR$$, Note that in Chapter VII, we expressed, $dR = \beta_1 dY + \beta_2 d\tau$

or, $$dF = \ell\beta_1 dY + \ell\beta_2 d\tau$$

Using this result in the private sector expenditure equation gives us:

$$dC = C_Y\left[g_Y \cdot dY - \gamma_2 \cdot \tau \cdot dY - \gamma_2 \cdot Y \cdot d\tau - \ell \cdot \beta_1 \cdot dY - \ell \cdot \beta_2 d\tau\right]$$

or, $$dC = C_Y\left[g_Y - \gamma_2 \cdot \tau - \ell \cdot \beta_1\right] dY - C_Y\left[\gamma_2 \cdot Y + \ell \cdot \beta_2\right] d\tau$$

Differentiation of the government budget constraint, which is equation no. 5, we get:

$$dG = dT + dR$$

or, $$dG = \tau \cdot dY + Y \cdot d\tau + \beta_1 \cdot dY + \beta_2 \cdot d\tau$$

or, $$dG = (\tau + \beta_1) dY + (Y + \beta_2) d\tau$$

In the final step of the derivation procedure, the model closing identity which is equation no. 1, is subjected to total differentiation. We get:

$$g_y \cdot dY = dC + dG$$

Replacing the differentiation results of dC and dG we can write:

$$g_y \cdot dY = C_y\left(g_y - \tau_2 \cdot \tau - l\beta_1\right)dY - C_y\left(\tau_2 \cdot Y + l \cdot \beta_2\right)d\tau + \left(\tau + \beta_1\right)dY + \left(Y + \beta_2\right)d\tau$$

or, $$dY\left(g_y - g_y \cdot C_y + \tau_2 \cdot \tau \cdot C_y + l \cdot \beta_1 \cdot C_y - \tau - \beta_1\right) = \left(Y + \beta_2 - Y \cdot \tau_2 \cdot C_y - l \cdot \beta_2 \cdot C_y\right)d\tau$$

$$\therefore \left.\frac{dY}{d\tau}\right|_R = \frac{Y\left(1 - \tau_2 \cdot C_y\right) + \beta_2\left(1 - l \cdot C_y\right)}{g_y\left(1 - C_y\right) - \tau\left(1 - \tau_2 \cdot C_y\right) - \beta_1\left(1 - l \cdot C_y\right)}$$

Where:

$\left.\frac{dY}{d\tau}\right|_R$ denotes the tax-effort coefficient with revenue sharing.

Without revenue sharing, equations 4, 6, 7, 8, and 9 will drop out. Therefore it can be shown that:

$$\left.\frac{dY}{d\tau}\right|_S = \frac{Y\left(1 - \tau_2 \cdot C_y\right)}{g_y\left(1 - C_y\right) - \tau\left(1 - \tau_2 \cdot C_y\right)}$$

Where:

$\left.\frac{dY}{d\tau}\right|_S$ denotes the tax-effort coefficient without revenue sharing.

APPENDIX III

Table-1 Showing Estimates of Gain/Loss Parameter

States	'ℓ'	States	'ℓ'
Alabama	0.74	Mishigan	1.53
Arizona	0.76	Minnesota	1.20
Arkansas	0.80	Mississippi	0.56
California	0.90	Missouri	0.90
Colorado	0.83	Montana	0.78
Connecticut	1.08	Nebraska	1.19
Delaware	1.51	Nevada	1.04
Florida	1.00	New Hampshire	1.00
Georgia	0.86	New Jersey	1.51
Idaho	0.80	New Mexico	0.51
Illinois	1.38	New York	1.12
Indiana	1.36	North Carolina	1.02
Iowa	1.44	North Dakota	0.74
Kansas	1.02	Ohio	1.42
Kentucky	0.82	Oklahoma	0.81
Louisiana	0.86	Oregon	1.06
Maine	0.89	Pennsylvania	1.14
Maryland	0.83	Rhode Island	1.08
Massachusettes	1.05	South Carolina	0.84

States	'ℓ'	States	'ℓ'
South Dakota	0.77	Virginia	0.74
Tennessee	0.88	Washington	0.71
Texas	0.97	West Virginia	0.82
Utah	0.74	Wisconsin	1.36
Vermont	0.85	Wyoming	0.82

Table-2 Showing States using the Senate Formula

States	Q	β_{S1}	β_{S2}
Alabama	0.35	0.0034	425040100
Arizona	0.33	0.0044	149335800
Arkansas	0.30	0.0053	251025400
Florida	0.12	0.0015	638422800
Georgia	0.24	0.0025	496908000
Idaho	0.30	0.0059	66534380
Indiana*	-0.19	0.0020	476206100
Iowa*	-0.27	0.0036	255849100
Kansas	0.10	0.0034	206362100
Kentucky	0.28	0.0037	370874900
Louisiana	0.24	0.0043	418232800
Maine	0.22	0.0064	95165940

Continued on next page.

States	α	β_{S1}	β_{S2}
Mississippi	0.51	0.0076	303444500
Montana	0.31	0.0058	63137420
Nebraska*	-0.05	0.0045	137155100
New Hampshire	0.12	0.0039	65010510
New Mexico	0.55	0.0066	103824900
North Carolina	0.10	0.0052	586740700
North Dakota	0.35	0.0077	58110830
Oklahoma	0.29	0.0033	265179100
North Carolina	0.26	0.0044	313276900
South Dakota	0.32	0.0082	65387940
Tennessee	0.23	0.0030	455183400
Texas	0.15	0.0004'	1211392000
Utah	0.35	0.0052	98600510
Vermont	0.25	0.0067	36010320
Washington	0.21	0.0025	267737050
West Virginia	0.28	0.0055	199636900
Wisconsin*	-0.20	0.0030	367172100
Wyoming	0.28	0.0058	26567680

Note that for states with an asterick (*) indicate that for them $\left.\frac{dY}{d\tau}\right|_R < \left.\frac{dY}{d\tau}\right|_S$

Table-3 Showing States using the House Formula

States	Q	β_{H1}	β_{H2}
California	0.21	0.0073	596202800
Colorado	0.27	0.002	-530134500
Connecticut	0.05	0.048	-519396600
Delaware	-0.33	0.34	-641749200
Illinois	-0.21	0.013	-15240670
Maryland	0.27	0.040	-374782200
Massachusettes	0.08	0.028	-267506000
Michigan	-0.35	0.017	-82534620
Minnesota	-0.06	0.046	-367445500
Missouri	0.21	0.037	-39629100
Neveda	0.08	0.35	-673817300
New Jersey	-0.33	0.02	-370332200
New York	0.01	0.0084	673365000
Ohio	-0.25	0.013	-170288200
Oregon	0.07	0.084	-496176100
Pennsylvinia	0.00	0.013	21087500
Rhode Island	0.05	0.19	-623603700
Virginia	0.35	0.037	-345429200

Table-4: Extension of Table-3

States	$\beta_{H2}/-\beta_{H1}$	M/N
California	N.R.	N.R
Colorado	6,487,863,000	56,600,000,000
Connecticut	10,812,680,000	63,000,000,000
Delaware*	N.R.	N.R.
Illinois*	N.R.	N.R.
Maryland	3,304,715,000	360,000,000,000
Massachusettes	9,431,675,000	168,000,000,000
Mishigan*	N.R.	N.R.
Minnesota*	N.R.	N.R.
Missouri*	10,781,130,000	33,000,000,000
Neveda	1,944,282,000	26,600,000,000
New Jersey*	N.R.	N.R.
New York	N.R.	N.R.
Ohio*	N.R.	N.R.
Oregon	5,880,521,000	41,300,000,000
Pennsylvinia*	-1,680,635,000	359,800,000,000
Rhode Island	3,149,202,000	27,500,000,000
Virginia	9,434, 317,000	10,000,000,000

Note that for states with an asterick (*) indicate that for them $\frac{dY}{d\pi}\Big|_R < \frac{dY}{d\pi}\Big|_S$.
N.R. (not reqired), indicate that for these states conclusions can be reached from Table-3.

SELECTED BIBLIOGRAPHY

Books

Break, George. Intergovermental Fiscal Relations in the United States. Washington D.C.: The Brookings Institute, 1967.

Gustely, Richard D. "Measuring the Regional Economic Impact on Federal Grant Programs," in Kenneth Hubbell (ed.), Fiscal Crisis in American Cities. Cambridge, Mass.: Ballinger, 1979.

Hansen, Alvin A. & Perloff, Harvey S. State and Local Finance in the National Economy. Norton, 1944.

Harbert, Anita S. Federal Grants-in-Aid. New York: Praeger Publisher Inc., 1976.

Harris, Robert. Income and Sales Taxes: The 1970 Outlike for States and Localities. Chicago: Council of State Governments, 1966.

Heller, Walter W. "A Sympathetic Reappraisal of Revenue Sharing," in Perloff, Harvey S & Nathan, Richard P (ed.), Revenue Sharing and the City. Baltimore, Maryland: John Hopkins Press, 1968.

Heller, Walter W. New Dimension of Political Economy. Cambridge, Mass.: Harvard University Press, 1966.

Hirsch, W.Z. The Economics of State and Local Government. New York: McGraw-Hill, 1970

Johnston, J. Econometric Methods. New York: McGraw-Hill, 1963.

Kmenta, Jan. Elements of Econometrics. New York: Macmillan, 1971.

Maxwell, James A. The Fiscal Impact of Federalism in the United States. Cambridge, Mass.: Harvard University Press, 1946.

Mitchell, W.E. & Walter, I (eds). State and Local Finances. New York: Ronald, 1970.

Musgrave, Richard A, "Approaches to a Fiscal Theory of Political Federalism," with discussion, in National Bureau of Economic Research, Public Finances, Needs, Sources and Utilization. Princeton, N.J.: Princeton University Press, 1961.

Musgrave, Richard A. & Musgrave, Peggy. Public Finance in Theory and Practice. New York: McGraw-Hill, 1980.

Mushkin, Selma J. & Cotton John F . Sharing Federal Funds for State and Local Needs. New York: Praeger Publisher Inc., 1969.

Nathan, R.P.; Manvel, A.D.; & Calkins, S.E. Monitoring Revenue Sharing. Washington D.C.: The Brookings Institute, 1975.

Netzer, Dick, "Financial Needs and Resources Over the Next Decade," in National Bureau of Economic Research, Public Finances: Needs, Sources, and Utilization. Princeton, N.J.: Princeton University Press, 1961.

Rafuse, Robert W., "Cyclical Behavior of State Local Finance," in Musgrave, R.A. (ed.), Essays in Fiscal Federalism. Washinton D.C.: The Brookings Institute, 1965.

Sneed, Joseph A. & Waldhorn, Steven (ed.), Restructuring the Federal System. New York: Crane, Russak & Company Inc., 1975.

Wallace, Oates E. Fiscal Federalism. New York: Harcourt Brace Johanovich, Inc., 1972.

Wagner, Richard E. The Fiscal Organization of American Federalism. Chicago: Markham, 1971.

Articles

Adams, Robert F. "The Fiscal Response to Intergovernmental Transfers in Less Developed Areas of the United States." Review of Economics and Statistics, vol. XLVIII, no. 3 (August 1966), pp. 308-318.

Ainsworth, Kenneth G. "A Comment on Professor Moneypenny's Political Analysis of Federal Grants-in-Aid." National Tax Journal, vol. XIII, no. 3 (September 1960), pp. 282-284.

________. "Alternative Procedures for Determining the Inter-State Effects of Grants-in-Aid." American Journal of Economics and Sociology, vol. XIX, no. 2 (April 1960), pp.297-309.

________. "The Impact of Grants-in-Aid upon the Industry of the States." American Journal of Economics and Sociology, vol. XVIII, no. 4 (October 1959), pp. 27-44.

________. "The Role of Grants-in-Aid in Public Finance." American Journal of Economics and Sociology, vol. XVIII, no. 3 (July 1959), pp. 361-368.

Bahl, Roy W., and Saunders, Robert J. "Determinants of Changes in State and Local Government Expenditures." National Tax Journal, vol. XVIII, no. 2 (March 1965), pp. 50-57.

Bishop, George A. "Stimulative Versus Substitutive Effects of State School Aid in New England." National Tax Journal, vol. XVIII, no. 2 (June 1964), pp. 133-143.

Bowman, John H. "Tax Exportability, Intergovernmental Aid, and School Finance Reform." National Tax Journal, vol. XXVII, (June 1974), pp. 163-173.

Bradford David F., and Oates, Wallace E. "An Analysis of Revenue Sharing." Quarterly Journal of Economics. vol. XXCV (August 1971b), pp. 416-439.

________. "The Analysis of Revenue Sharing in a New Approach to Collective Fiscal Decisions." Quarterly Journal of Economics, vol. LXXXV, no. 3 (August 1971), pp. 416-439.

Break, George F. "Revenue Sharing - It's Implications for Present and Future Intergovernmental Fiscal Systems: The Case For." National Tax Journal, vol. XXIV, no. 3 (September 1971), p. 311.

Breton, Albert. "Public Goods (and Federalism): A Reply." Canadian Journal of Economics and Political Science, vol. XXXII, no. 2 (May 1966), pp. 238-242.

Buchanan, James. "Federalism and Fiscal Equity." American Economic Review, vol. XL (September 1950), pp. 583-599.

_________. ""ARejoinder", (To H.P. Jenkins' Comment on Buchanan's "Federalism and Fiscal Equity")." Journal of Political Economy, vol. LIX, no. 4 (August 1951), pp. 358-359.

_________. ""AReply", (To A.D. Scott's Comment on Buchanan's "Federal Grants and Resourse Allocation")." Journal of Political Economy, vol. LX, no. 6 (December 1952), pp. 536-538.

_________. "Federal Grants and Resourse Allocation." Journal of Political Economy, vol. LX, no. 3 (June 1952), pp. 208-217.

Buchanan, James., and Stubblebine, William. "Externality." Economica, vol. XIX (November 1962), pp. 371-384.

Clement, M.O. "Interstate Fiscal Equity and Federal Grants-in-Aid: An Empirical Method and it's Application, Fiscal 1952." Southern Economic Journal, vol. XXIX, no. 4 (April 1963), pp. 279-296.

Coase, Ronald. "The Problem of Social Cost." Journal of Law and Economics, vol. III (October 1960), pp. 1-44.

Dresch, Stephen P. "An "Alternative" View of the Nixon Revenue Sharing Program." National Tax Journal, vol. XXIV, no. 2 (June 1971), pp. 131-142.

Eapen, A.T. "Federalism and Fiscal Equity Reconsidered." National Tax Journal, vol. XIX, no. 3 (September 1966), pp. 325-329.

Faith, Roger L. "Local Fiscal Crisis and Intergovernmental Grants: A Suggested Hypothesis." Public Choice, vol. XXXIV, no. 3-4 (1979), pp. 316-331.

Fisher, Ronald C. "A Theoretical View of Revenue Sharing Grants." National Tax Journal, vol. XXXII, no. 2 (June 1979), pp. 175-181.

Follain, James R. Jr. "Grant Impacts on Local Fiscal Behavior: Full-Information Maximum Likelihood Estimates." Public Finance Quarterly, vol. VII, no. 4 (October 1979), pp. 478-500.

Foeller, William H. "Differential Tax Incidence of State Educational Grant-in-Aid Programs in Iowa." National Tax Journal, vol. XXVII, (June 1974), pp. 9-18.

Glickman, Norman J. "An Econometric Forecasting Model for the Philadelphia Region." Journal of Regional Science." vol. X (April 1971), pp. 15-33.

Goetz, Charles J. "Federal Block Grants and Reactivity Problem." Southern Economic Journal, vol. XXXIV, no. 1 (July 1967), pp. 160-165.

Gramlich, Edward M. "Alternative Federal Policies for Stimulating State and Local Expenditures." National Tax Journal, vol. XXI (June 1968), pp. 119-129.

Gramlich, Edward M., and Galper Harvey. "State and Local Fiscal Behavior and Federal Grant Policy." Brookings Papers on Economic Activity, vol. I (1973), pp. 16-68.

Groves, Harold M. "New Source of Light on Intergovernmental Fiscal Relations." National Tax Journal, vol. V, no. 3 (September 1952), pp. 234-238.

Harris, Joseph P. "The Furure of Federal Grants-in-Aid." The Annals of the American Academy of Political and Social Science. vol. CCVII (January 1940), pp. 14-26.

Haskell, Mark A. "Federal Grants and Budgetary Distortion." Quarterly Review of Economics and Business, vol. II, no. 2 (May 1962), pp. 79-87

_________. "Federal Grants and Income-Density Effect." National Tax Journal, vol. XV. no. 1 (March 1962), pp. 105-108.

_________. "Federal Grants-in-Aid: Their Influence on State and Local Expenditures." Canadian Journal of Economics and Political Science, vol. XXX, no. 4 (November 1964), pp. 585-591.

Henderson, James. "Local Government Expenditures: A Social Welfare Analysis." Review of Economics and Statistics, vol. L (May 1968), pp. 156-163-

Holcombe, Randall G., Zardkoohi, Asgher. "The Determinants of Federal Grants." Southern Economic Journal, vol. XLVIII, no. 2 (October 1981), pp. 393-399.

Horowitz, Ann R. "Income Distribution in Grants-in-Aid Equity Analysis: Comment." National Tax Journal, vol. XVIII, no. 4 (December 1965), pp. 439-441.

James, Louis J. "The Stimulation and Substitution Effects of Grants-in-Aid: A General Equilibrium Analysis." National Tax Journal, vol. XXVI, (June 1973), pp. 251-265.

Johnson, Darwin G., and Mohan, Charles M. "Revenue Sharing and the Supply of Public Goods." National Tax Journal, vol. XXIV, no. 2 (June 1971), pp. 157-167.

Johnson, Marvin B. "Recognizing the Competitive Nature of General Revenue Sharing Grants." Communications, Southern Economic Journal, (July 1977), pp. 143-147.

Jurion, B.J. "Matching Grants and Unconditional Grants: The Case with n Goods." Public Finance, vol. XXXIV, no. 2 (1979), pp. 234-244.

Manvel, Allen D. "Regional Differences in the Scale of State and Local Government." National Tax Journal, vol. VII, no. 2 (June 1954), pp. 110-120.

Maxwell, J.A. "Revenue Effort as a Determinant of Grants." Journal of Economic Issues, (September 1972), pp. 142-145.

__________. "Tax Effort as a Determinant of Revenue Sharing Allotments." Harvard Journal of Legislation, vol. X, no. 4 (December 1973)

__________. "Countercyclical Role of State and Local Governments." National Tax Journal, vol. XI, no. 4 (December 1958), pp. 371-376.

__________. "Recent Developments in Federal-State Financial Relations." National Tax Journal, vol. XII, no. 4 (December 1960), pp. 310-319.

__________. "The Equalizing Effects of Federal Grants. Journal of Finance, vol. IX, no. 2 (May 1954), pp. 209-215.

Miller, Edward. "The Economics of Matching Grants: The ABC Highway Program." National Tax Journal, vol. XXVII, (June 1974), pp. 221-229

Monypenny, Phillip. "Federal Grants-in-Aid to State Governments: A Political Analysis." National Tax Journal, vol. XIII, no. 1 (March 1960), pp. 1-16.

Mushkin, Selma J. "Barriers to a System of Federal Grants-in-Aid." National Tax Journal, vol. XIII, no. 3 (September 1960), pp. 193-218.

__________. "Distribution of Federal Taxes Among the States." National Tax Journal, vol. IX, no. 2 (June 1956), pp. 148-165.

__________. "Federal Grants and Federal Expenditures." National Tax Journal, vol. X, no. 3 (September 1957), pp. 190-213.

__________. "Report of the Commission of Intergovernmental Relations." Review of Economics and Statistics, vol. XXXIX, no. 3 (August 1957) pp. 334-341)

Mushkin, Selma J., and Adams, Robert F. "Emerging Patterns of Federalism." National Tax Journal, vol. XIX, no. 3 (September 1966), pp. 225-247.

Osman, Jack W. "The Dual Impact of Federal Aid on State and Local Government Expenditures." National Tax Journal, vol. XIX, no. 4 (December 1966), pp. 362-372.

Pechman, Joseph A. "Fiscal Federalism for the 1970's." National Tax Journal, vol. XXIV, no. 3 (September 1971), pp. 282-283.

Plummer, James L. "Federal-State Revenue Sharing." Southern Economic Journal, vol. XXIII, no. 1 (July 1966). pp. 120-126.

_________. "Federal-State Revenue Sharing: Further Comment." Southern Economic Journal, vol. XXXIV, no. 1 (July 1967), pp. 166-168

Sacks, Seymour., and Harris, Robert. "The Determinants of State and Local Government Expenditures and Intergovernmental Flows of Funds." National Tax Journal, vol. XVII, no. 1 (March 1964), pp. 75-85.

Schaller, Howard G. "Federal Grants-in-Aid and Differences in State Per-Capita Income, 1929, and 1949." National Tax Journal, vol. VIII, no. 3 (September 1955), pp. 287-299.

Scott, Anthony D. "A Note on Grants in Federal Countries." Economica, vol. XVII, no. 68 (November 1950), pp. 416-422.

_________. "The Evaluation of Federal Grants." Economica, vol. XIX, no. 76 (November 1952), pp. 377-394.

_________. "Federal Grants and Resource Allocation." Journal of Political Economy, vol. LX, no. 6 (December 1952), pp. 534-536.

_________. "The Economic Goals of Federal Finance." Public Finance, vol. XIX, no. 3 (1964).

Sharp, Ansel M. "The Counter-Cyclical Fiscal Role of State Governments during the 'Thrrties'." National Tax Journal, vol. XI, no. 2 (June 1958), pp. 138-145.

Smith, David L. "The Response of State and Local Governments to Grants." National Tax Journal, vol. XXI, no. 3 (September 1968), pp. 349-357.

Spangler, Richard. "The Effect of Population Growth upon State and Local Government Expenditure." National Tax Journal, vol. XVI, no. 2 (June 1963), pp. 193-196.

Strauss, Robert P. "The Impact of Block Grants on Local Expenditures and Property Tax Rates." Journal of Public Economics, vol. III (August 1974). pp. 269-284.

Teeples, Ronald K. "A Model of Matching Grants-in-Aid Program with External Tax Effects." National Tax Journal, vol. XXII (December 1969), pp. 486-495.

Tiebout, Charles M. "A Pure Theory of Local Expenditures." Journal of Political Economy, vol. LXIV, no. 5 (October 1956), pp. 416-424.

Thurow, Lester. "The Theory of Grants-in-Aid." National Tax Journal, vol. XIX, no. 4 (December 1966), pp. 373-377.

__________. "Aid to State and Local Governments." National Tax Journal, vol. XXIII, (March 1970).

Weicher, John C. "Aid, Expenditures and Local Government Structure." National Tax Journal, vol. XXV, (December 1972), pp. 573-583.

Wilde, James A. "Grants-in-Aid: The Analytics of Design and Response." National Tax Journal, vol. XXIV, (June 1971), pp. 143-155.

__________. "The Expenditure Effects of Grant-in-Aid Programs." National Tax Journal, vol. XXI (September 1968), pp. 340-348.

Williams, Alan. "The Optimal Provision of Public Goods in a System of Local Government." Journal of Political Economy, vol. LXXIV, no. 1 (February 1966), pp. 18-33.

Papers and Proceedings

Burger, Alvin A. "Local and Federal Pressures on State Revenues." Proceedings of the Fifty-Third Annual Conference of National Tax Association, (1960), pp. 101-108.

Chen, D. "A Tabular Survey of Selected Regional Econometric Models." Working Paper II, Federal Reserve Bank of San Francisco, (1972).

Freeman, Roger A. "Federal Grants and the Decline of the Federal System." Proceedings of the Fifty-Eight Annual Conference of the National Tax Association, (1965), pp. 134-161

Greytak, David., and Taussig, Dale. "Revenue Stabilising Grants: A Proposal." Proceedings of the Sixty-Fourth Annual Conference on Taxation, National Tax Association, Kansas City, Colombus Ohio, (September 1971), pp. 47-54

Inman, Robert. "Toward an Econometric Model of Local Budgeting." Proceedings of the Sixty-Second Annual Conference on Taxation, National Tax Association, (1971), pp. 699-719

Johnson, Marvin B. "Community Income, Intergovernmental Grants, and Local School District Fiscal Behavior." Paper presented at the Meeting of the Committee on Urban Public Economics in New York, (November 1977)

Mushkin, Selma J. "The Fiscal Capacity of the States." Proceedings of the Fifty-First Annual Conference of the National Tax Association, (1958), pp. 297-307.

Schaller, Howard G. "Federal Grants-in-Aid: A Review." Proceedings of the Fifty-Eight Annual Conference of the National Tax Association, (1965), pp. 96-112.

Sharp, Ansel M. "The Behavior of Selected State and Local Government Fiscal Variables During the Phases of the Cycles, 1949-1961." Proceedings of the Fifty-Eight Annual Conference of the National Tax Association, (1965), pp. 599-614.

Government Documents

Advisory Commission on Intergovernmental Relations. Measures of State and Tax Effort, Washington D.C., U.S. Government Printing Office, 1962

Dales, Sophie R. "Federal Grants to State and Local Governments." Social Security Bulletin, vol. XXII, no. 7 (July 1960), pp. 3-10.

________. "Federal Grants, 1961-62." Social Security Bulletin, vol. XXVI, vol. 6 (June 1963), pp. 7-14.

________. "Federal Grants, 1962-63." Social Security Bulletin, vol. XXVI, no. 6 (June 1964), pp. 15-26.

________. "Federal Grants, 1963-64." Social Security Bulletin, vol. XXVIII, no. 6 (June 1965), pp. 3-13.

________. "Federal Grants, 1964-65." Social Security Bulletin, vol. XXIX, no. 6 (June 1966), pp. 10-24.

U.S., Presidential Statement #6 on Economic Issues. "Strengthening State-Local Government," October 28, 1964, Washington D.C., Government Printing Office, 1964.