FILE COPY
DO NOT REMOVE

143-72

INSTITUTE FOR RESEARCH ON POVERTY DISCUSSION PAPERS

FISCAL CAPACITY AND THE ESTIMATION METHOD OF THE ADVISORY COMMISSION ON INTERGOVERNMENTAL RELATIONS

John S. Akin

UNIVERSITY OF WISCONSIN - MADISON

FISCAL CAPACITY AND THE ESTIMATION METHOD OF THE ADVISORY COMMISSION ON INTERGOVERNMENTAL RELATIONS

John S. Akin

The research reported here was supported in part by funds granted to the Institute for Research on Poverty at the University of Wisconsin by the Office of Economic Opportunity pursuant to the provisions of the Economic Opportunity Act of 1964. The author thanks Robert H. Haveman and Harvey E. Brazer for comments and suggestions, but retains responsibility for all views expressed herein. Special acknowledgment is due Timothy Smeeding who provided assistance in data preparation, computer utilization, and many other areas.

October 1972

ABSTRACT

Estimation of fiscal capacity--ability of governmental units to raise tax revenues from their own sources--is difficult both conceptually and empirically. Recently, because of the renewed popularity of the idea of revenue sharing as well as recent court decisions dealing with the ability of local school districts to adequately finance education, measurement of fiscal capacity has become an important policy issue. This paper's main focus is both a critique of the most widely publicized fiscal capacity estimation method, that of the Advisory Commission on Intergovernmental Relations (ACIR), and a suggestion of an alternative estimation technique. The ACIR measure is singled out as a focus of criticism because of its apparent widespread acceptance by policy analysts and policy makers. Perhaps this paper will serve to stimulate further thought and research upon this topic before programs of aid based upon any specific fiscal capacity measure are adopted.

FISCAL CAPACITY AND THE ESTIMATION METHOD OF THE ADVISORY COMMISSION ON INTERGOVERNMENTAL RELATIONS

John S. Akin

The recent Advisory Commission on Intergovernmental Relations (ACIR) study concerning measurement of fiscal capacity "mainly concerns the question: Is it possible to make meaningful comparisons of the capacity . . . of various areas and governmental bodies to finance public services?"[1] Fiscal capacity as it is usually interpreted can be defined as the ability of an area or governmental unit to raise revenue in order to finance public services given the tax sources available.

The importance of being able to accurately measure this capacity derives from several policy-oriented applications. Fiscal capacity is important simply because it provides information to citizens and policy-makers. It is of major importance that individuals living in states and localities be able to gauge the tax effort relative to taxable resources of their governments in comparison to other governments. The relative effort involved in raising a certain amount of revenue can be accurately estimated only if relative abilities to raise revenues are known. It is also of importance to provide measures of fiscal capacity that allow both citizens and decision-makers to understand that the fiscal effort of a given area should be measured as total tax revenues raised <u>for all purposes</u> from the taxable resources of a given area in relation to the taxes that could reasonably be expected to be raised, rather than some more simplistic concept of effort such as that inherent in the idea that the

effort index of a school district can be considered as the property tax rate levied for school purposes.

However, accurate measurements of fiscal capacity are needed for more practical reasons. It is a policy reality that, because many federal-to-state and state-to-local grants desire to be redistributive from units with more capacity to raise revenues from their own resources to units with less capacity, fiscal capacity estimates are included in various aid formulae. The federal government sets up formulae such that health and public welfare aid amounts vary inversely with per capita personal income, and almost all states have aid to education systems which provide higher per pupil aid levels to those school districts having smaller amounts of taxable property per pupil. There is also discussion of new legislation to provide federal revenue sharing to states and localities under a system which allows per capita amounts to vary inversely with some measure of fiscal capacity.

A recent development in the courts has also provided added judicial and legislative impetus to the necessity of deriving accurate and equitable fiscal capacity measures. This court action came in the recent California State Supreme Court decision in the case of Serrano vs. Priest.[2] The court's ruling--that it is a violation of the equal protection clause of the Fourteenth Amendment to the U.S. Constitution to discriminate on the basis of school district taxable wealth in expenditures for public education--illuminates the necessity to measure local taxable wealth efficiently. The California court in this decision implicitly accepts taxable property values as a legitimate measure of district wealth or fiscal capacity. However, there is little reason to believe that later decisions of this

type will not take the position that effective equalization of taxable property values does not necessarily constitute equalization of ability to finance education (or other public services). It seems obvious that research into better methods of measuring local revenue raising capacity than the simple measurement of taxable property is called for if the intent of the Serrano decision--equalization of capacity of districts to fulfill the needs of students, given equal tax effort--is to be realized. Even though the present court actions are concerned with the provision of education at the local level, it is becoming evident in the U.S. that there is a concern that the ability to finance public services of all types, at the state and local levels, is partially a function of the taxable resources of the units. While the courts may or may not push further the idea of equalization of ability to finance public services in states and localities, it is obvious that legislative attempts in this direction at both the state and federal level can be anticipated. If efforts to remove the effects of unequal fiscal capacity are to come, it is imperative that good estimates of fiscal capacity be available to policy-makers and voters.

Of the existent methods of measuring fiscal capacity that of the ACIR tends to be most prominent, and therefore most likely to replace the presently predominant working definitions of fiscal capacity--personal income for states and taxable property for localities. The ACIR measures appear to have gained this position of prominence for two major reasons:

1) The Advisory Commission is federally sponsored, and its members include three U.S. Senators, three U.S. Representatives, three representatives from the federal executive branch, four governors, four mayors, three members of state legislative bodies, three elected

county officials, and three private citizens. The federal sponsorship combined with the high governmental positions of most of the members tends to provide the image of an official government agency to the ACIR, and an aura of semi-officiality to the studies carried out for this Commission. When the ACIR suggests a method of operation there is a tendency for state and local governments, as well as individuals, to consider this method as the officially accepted one of the U.S. government.

2) The ACIR is able to publicize its studies much more widely than most individuals or groups. The U.S. government publishes and distributes Advisory Commission studies and most governmental units and libraries of any size receive copies. The power of the federal government, therefore, provides the ACIR with much opportunity to publicize its studies and this wide publicity, even from a pure probability standpoint, tends to lead to widespread acceptance or at least recognition of ACIR viewpoints.

The widespread availability of the ACIR fiscal capacity estimation methodology and the resultant high probability of its adoption, when and if better measures of fiscal capacity are sought by government, makes it important to point out certain deficiencies of the methodology and to suggest a preferable approach to fiscal capacity estimation. The estimation method suggested here will be based upon certain assumptions about economic reality that tend to differ from those implicit in the ACIR methodology. However, it should be emphasized that this paper mainly attempts to provide evidence that, even if the basic ACIR emphasis and data are assumed to be correct for the estimation of fiscal capacity, the ACIR researchers have used a methodology which suffers from serious defects.

The most serious of these pure methodological defects are the use of weighted average tax rates rather than regression coefficients and the use of a partial analysis framework which tends to deny the importance of interactions among the various tax bases and rates within a given governmental unit.

The ACIR first published a methodology for measuring fiscal capacity in 1962.[3] In 1971, a revised but essentially identical methodology was presented.[4] It is the purpose of this paper to evaluate and criticize this methodology. The primary conclusion is that the ACIR method yields biased estimates of both state and local fiscal capacity. This paper points out the main shortcomings of the methodology and provides evidence that the use of a preferred methodology with the same data[5] results in important differences in state fiscal capacity estimates.[6] Fiscal capacity is also estimated with this preferred methodology and different tax bases, chosen on the basis of economic hypotheses. It is the author's contention that the estimates thus derived are preferable to either the ACIR estimates or estimates using ACIR bases and the preferred methodology.

In the most recent study the ACIR estimates the base of each of the 26 most commonly levied state and local taxes, on a nationwide basis.[7] The ACIR fixes a single rate which, when levied simultaneously upon the relevant tax bases in each state, will produce the same total tax revenue in the nation that is actually being produced by these taxes in the states in which they are employed. In other words, the ACIR assumes that each type of tax base will provide the same tax revenues nationwide, but that these revenues will be raised by taxing the base in question at the rate necessary to raise this total revenue when all states tax this base at equal rates. Essentially

the same methodology is used within states for determining local fiscal capacity. Total fiscal capacity for a state using this methodology is simply the sum of the amounts that would be raised by taxing each base in the state at the nationwide state base weighted average tax rate (including zero tax rates for those states not levying a tax on a given base) for the given base.[8]

Although it would seem a priori that the intermix of bases is of importance for determining the expected yield from a given base in a given governmental unit, no effort is made by the ACIR study to determine the ability of different units to tap the various tax bases due to the particular mix of other bases and rates that exist in the unit. This approach in effect assumes that while dealing with each base separately, the other bases are all present at identical relative levels in each unit. If this were not assumed it would be unrealistic to assume that the base in question could be tapped at identical rates in each state or locality. Logically, then, this whole system seems to be based upon a paradox. It is necessary to assume average relative amounts of each base in order to build this representative tax system. Yet the whole basis of the system is the assumption that the bases are different in different units and therefore lead to different magnitudes of fiscal capacity. The ACIR is making the large implicit assumption that the relative mix of tax bases is identical in each state and that for this reason each base can be taxed at the average rate in each state.

The ACIR's average tax rate weighting method assumes that simple relationships between single independent variables (tax bases) and the dependent variable (tax revenues from this base) will not change when

different mixes of bases and levels of these various bases exist among the various units analyzed. The use of average tax rates must make this assumption because this methodology cannot handle the problem of coexisting tax rates. The average relationship of each base to its tax revenues is determined with no allowance for the fact that the heavy use of one base may preclude the heavy use of another, because of the constraint of income and wealth. The ACIR approach, therefore, fails to take into account the incidence of various types of taxes upon the taxpayers with the unit. This inability of the ACIR method to handle coexisting bases in taxing jurisdictions is probably its most serious fault. The only relationship between income and ability to raise tax revenues recognized by the ACIR method is the one implied by the average rate of state and local income taxes applied to the unit's income. That the ability to tax property depends to a large extent upon income levels is never taken into account when either income or property tax rates are set in the estimates. A state with extremely high income but low property values (here assuming no other tax bases so as to simplify the concepts) would, by the ACIR method, be shown to have a lower fiscal capacity than a state with much lower income but more taxable property. This is due to the fact that because property is generally more heavily taxed than income in states and localities, the ACIR index weights property heavily and income lightly. Income is not weighted on the basis of being the base from which most tax revenues must in the final analysis come; but only on the basis of the average rate at which it is <u>directly</u> taxed in states and localities. Economic theory would suggest that the main reason property can be taxed is that property owners tend to have incomes. Weighting

property as a tax base without regard to the underlying income would therefore seem to be a questionable exercise.

What is actually desired in attempting to measure fiscal capacity is the relationship between taxable resources and tax revenues, or, stated differently, the manner in which tax revenues can be expected to systematically vary with reference to tax bases. In other words, it is assumed that there is some actual functional relationship between bases and revenues.

Multiple linear regression analysis takes into account the fact that it is the variation in <u>total</u> tax revenues as bases vary, not tax rates on individually considered bases, that matters in measuring fiscal capacity; and that the variation in revenues is in fact due to the interaction of many forces. For any analysis of fiscal capacity to be complete a method must be used that allows the relationship among numerous variables to be analyzed.

The method of multiple linear regression analysis allows us to measure the relation of a single dependent variable, actual local revenues, to a combination of other variables (the relevant tax bases) and to the individual elements of the combination. This method can measure and reduce to precise terms the effects of the various tax bases on revenues in the states. A coefficient of multiple determination (R^2) is also derived which is an index of the degree of relationship between the single dependent variable and a number of independent variables, in combination. It measures the extent to which variations in the dependent variable are related to the <u>combined</u> action of the other variables. Regression coefficients can be interpreted as representing the "norms" of taxable capacity related to the existence

of the given bases. Multiple regression analysis also allows for recognition of the fact that bases exist in combination and that the existence of taxable resources may lead to higher fiscal capacity estimates for reasons other than the fact that a direct tax is levied upon it (this is especially true for income).

A second methodological defect would exist, however, even if tax bases and the amount of revenue that can be raised from them were completely independent of the other bases and rates within the unit. If what is desired in a fiscal capacity measure is a means of estimating the added revenues that would result from an addition to a tax base, then it is a marginal rather than an average tax rate that is applicable.

The ACIR method takes a simple weighted (by base) arithmetic mean of tax rates. Each tax rate determined by the ACIR method is a weighted (by magnitude of base) average tax rate for the nation as a whole. This tax rate is determined as follows:

$$\text{Average Tax Rate on Base A} = \frac{\text{Total Tax Revenues from Base A}}{\text{Total Tax Base A}}$$

or

$$\text{Total Tax Revenues from Base A} = \text{Average Tax Rate on Base A (Total Tax Base A)}$$

or, in algebraic form,

$$Y = bX$$

or

$$b = \frac{Y}{X}$$

From examining the equation for obtaining the ACIR tax rate, it is clear that the implicit estimating equation for each tax base is constrained to pass through the origin. Therefore, even if it were not necessary to determine the effects of the different bases when combined (i.e., if a simple relationship between each independent variable and the dependent

variable were sufficient for prediction purposes) the use of average tax rates would be inferior to the use of simple regression analysis in determination of the relationship between bases and revenues. The regression equation of the form:

Total Tax Revenues from Base A = a + b (Total Tax Base A)

or, algebraically,

$$Y = a + bX$$

or

$$\frac{a}{X} + b = \frac{Y}{X}$$

or

$$b = \frac{Y - a}{X}$$

does allow the fitted regression line to pass through a point other than the origin. One major difference between using a simple regression analysis coefficient and a simple weighted average for prediction of tax revenues raised is that the use of the weighted average constrains the estimating equation to pass through the origin while regression analysis does not. The regression method estimates a marginal relationship while the use of the average estimates, as the term implies, an average relationship. This difference between the two methods could be especially important in the case of taxes which exempt certain minimum levels of tax bases from taxation. A hypothetical example can help to clarify these points. It can be seen in Figure 1 that the marginal tax rate on Base A, whose first three units are exempt from taxation, is .5. This relationship can be captured very well by a regression line which is not constrained to pass through the origin. The estimated line has the slope of the marginal tax rate and intercepts the Y axis at -.5. But the average tax rate is .38 and can be represented by a line passing

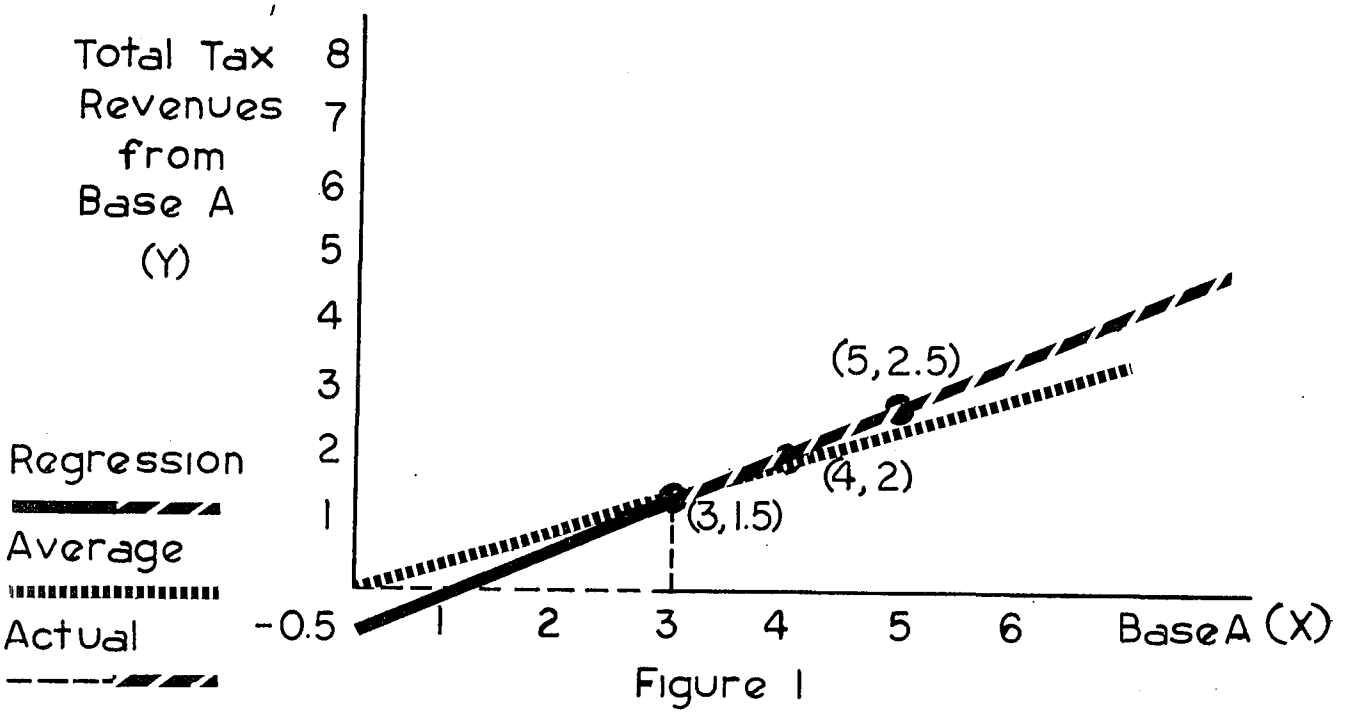

Figure 1

through the origin with a slope of .38. These two estimating equations will give us equal values for Total Tax Revenues from Base A only at the one point at which Base A equals 4.167. When the base is smaller than this the average overestimates revenues, and when it is larger the average underestimates revenues. The regression line overestimates revenues for less than three units of the base but is correct thereafter. It is quite obvious that if an equation that will predict taxing behavior with regard to tax bases at the margin is desired, the use of regression coefficients for weighting is preferable to the use of weighted average tax rates.

Perhaps the most important difference in an average and a regression coefficient concerns the efficient use of available data. The regression method fits a line to the observation in a manner which takes into account each deviation of an observed value from the estimated linear relationship. An average takes no account of how points are scattered; it simply implies a line from the origin through the point of means. When an average is

used, therefore, much useful information concerning the relationships of variables is lost. This is not true with the regression method which fits a line by minimizing the sum of squared deviations. It is for this reason that regression methods are almost always to be preferred to simple averages.

A third problem with the ACIR approach concerns the arbitrary choice of tax bases. No reasonable attempt is made to explain why the tax bases most used in the nation actually best represent tax collecting capacity. Using this representative tax system approach there are theoretically as many possible measures for fiscal capacity as there are possible different tax structures and rate combinations.

An economically realistic case can be built for stating that only added income (in various forms) can lead to added fiscal capacity. After all, it is income or claims upon productive resources, that tax collectors take, not such things as pieces of property. As a polar example, one could think of a unit in which the residents tax away all possible resources each year and live communally in a unit completely closed to the rest of the world and in which no capital is used in production. Obviously the maximum possible taxation would be total resident income. Neither the value of property, total sales, gasoline sales nor any other variable would be useful for measuring fiscal capacity. Income represents the year's flow of claims on resources of the residents and would obviously be the correct measure of taxable capacity. The addition of capital to this simple world should not change the fiscal capacity measure since only the output of the capital could be used for public consumption unless consumable capital goods existed and the unit desired to deplete its future productive capacity in order to consume in the present. Opening the unit to the rest of the world changes the perspective

somewhat, however. Outsiders now do such things as work in the community, shop in the community, and travel through the community; and residents do the same in other communities. To the extent that equal use of each unit's public resources by outsiders occurs, no economic rationale for taxation of outsiders exists. It would therefore seem unnecessary to add to the fiscal capacity of one unit because it can tax the income of nonresidents while at the same time subtracting out that portion of resident income that can be taxed by other units. However, if some units have large numbers of outsiders performing activities within its boundaries it may be true that it gains the ability to tax more outsiders than it loses due to its own residents' activities outside the community. It seems reasonable then to assume that the fiscal capacity of units increases to the extent that they have more ability to tax nonresidents than other communities have the ability to tax their residents. The only other assumption which has to be removed to reach a realistic situation is the one which states that all taxable resources are taxed away each year. From the above analysis it would seem that what is desired in a fiscal capacity measure, is an estimate of some expected rate of taxation upon resident income plus an expected rate of taxation of such nonresident income as can be taxed by the unit. Wealth should be weighted as a tax base only to the extent that it represents a stock of income which can possibly be liquidated and used to pay taxes.

Therefore the suggestion presented is that as an alternative to the ACIR, estimates be used as a multiple regression estimated relationship between public revenues collected and variables representing ability to tax resident and nonresident income and wealth. It is expected that the coefficients on wealth variables will be smaller than the coefficients upon income variables because of the fact that income is the true taxable resource and wealth only represents a less liquid stock of past income.

Because no absolutely "correct" definition of fiscal capacity exists, any attempt to measure it must make certain assumptions. The ACIR methodology implicitly assumes that an "average" of actual taxing behavior is to be the estimate of fiscal capacity. No fault is found with that assumption. One purpose of this paper is to point out that there are strong reasons for suggesting that the multiple regression method of determining "average" expected tax collections for units having given characteristics is preferable to the method of using a weighted average tax rate on individual tax bases. Using the actual state fiscal capacity data upon which the ACIR estimates are based, evidence will also be provided that:

1) The weights on various bases do differ to a large degree when multiple regression analysis is substituted for the ACIR method of using simple weighted averages of existing tax rates.
2) The weights from the regression method more heavily emphasize what could be called primary tax bases--income, liquid wealth, and ability to tax outsiders.
3) The estimates of fiscal capacity for states do differ considerably under the two methods.
4) The ability of the multiple regression derived estimates to explain actual behavior is appreciably greater.
5) The use of only a few independent variables chosen on the basis of simple economic analysis not only provides a more theoretically sound fiscal capacity measure but also explains actual behavior better than the average rates applied to twenty-six bases in the ACIR methodology.

The use of regression techniques on data representing actual revenue collections of the units analyzed gives importance to the reality of the democratic process. The norms that result reflect the actual results of

the political taxing and revenue raising process in the states. The use of this method allows fiscal capacity to reflect what can in reality be expected, given the political system and attitudes that exist. It shows the normal (in the sense of reflecting actual behavior of states with given resources mixes) amount of revenues that can be expected to be raised by a given state.

This method for estimating fiscal capacity is based upon the notion that behavior in accordance with average relationships between taxes levied or collected and the independent variables provides an appropriate norm. The term "capacity", used in this context, is meant to imply not an upper limit or bound on the amount of revenue that might be raised, but rather the amount that would be raised by a local unit if that unit responded to the "predictor" variables in accordance with the "average" response of all units subject to this analysis. Tax receipts in excess of the amount indicated by the estimating equation suggest a greater than average willingness to pay taxes or a greater than average taste for public services. Tax receipts below that amount, by the same token, simply indicate a lesser preference for taxes and the implied public services. Because of this characteristic the index of fiscal capacity may also be said to provide a tool for deriving indications of relative fiscal effort. High, low, or medium effort may be gauged simply by comparing actual with expected tax receipts.

Fiscal capacity is first estimated by regressing actual tax revenues raised in the states upon all 26 ACIR tax bases to determine the weights that this methodology places upon these bases.

It is hoped that this large equation will illustrate that the relative weights placed upon the various independent variables when fiscal

capacity is estimated by multiple regression analysis, in which all variables vary coincidentally, differ in magnitude to a large degree from the tax rates determined by the ACIR simple weighted average method. Because of these different weights, the estimates of fiscal capacity for states also vary considerably under the two methodologies. The attempt is to illustrate that such variables as income and variables representing ability to tax nonresidents should be weighted more heavily than other variables which represent tax bases only to the degree that they are proxies for income, liquid wealth, or ability to tax outsiders. In Table 1 the parameters derived by regressing actual tax revenues upon all 26 ACIR tax base variables are listed alongside the average tax rates placed upon these same bases by Manvel and his ACIR researchers.

The estimates of fiscal capacity are expected to weight heavily variables which represent direct control over income and to weight other variables less heavily. It is, however, realized that, even though the estimated parameters are nonbiased, one can have little faith in the absolute size of most of them because of the fact that there are only 51 observations upon which to estimate 26 parameters. That none of the estimated coefficients have "t" values of greater than two, lends strong credence to this expectation. However, the fact that the "F" value for the predictive ability of the estimated relationship is significant at the .0002 level indicates that the predicted values for fiscal capacity can, with some confidence, be accepted.

The R^2 in this paper is .83 (.64 when adjusted to take account of the few degrees of freedom)[9], while the R^2 obtained by regressing the ACIR fiscal capacity estimates upon actual tax revenues is only .44, provides strong evidence for the superiority of the regression estimate. While the

TABLE 1

Advisory Commission on Intergovernmental Relations Average Tax Rates and Multiple Regression Coefficients for Twenty-six Tax Bases, 1966-67

BASE	WEIGHT		
	ACIR Tax Rate	Multiple Regression (26 Independent Variables) Coefficient	Standardized Regression Coefficient (Beta)[a]
Constant	-----	66.18	-----
General sales (GSALES)	.0377	.0959	.3949
Motor fuel consumption (gallons) (FUEL)	.0664	-.2719	-.3062
Tobacco sales (TOBAC) (cigarettes)	.0680	-.0256	-.3096
Alcoholic beverage sales (gallons) (BEV)	4.7400	-14.51	-.2507
Utility (electric, gas, telephone) receipts (UTIL)	.0265	-.3172	-.1578
Amusement earnings (AMUSE)	.1640	.0268	.0187
State personal income minus federal individual income tax (SPIFIIT)	.0053[b]	.0342	.2636
Passenger vehicle registration (AUTO)	25.9000	-316.2400	-.2668
Truck and bus registration (TRUCK)	78.7600	65.4900	.0504
Federally taxable income in AGI[c] under $2000 class (AGI 2)	.0081	.4926	.0355
Federally taxable income in AGI in $2000 to $3000 class (AGI 23)	.0081	1.6888	.2166
Federally taxable income in AGI in $3000 to $4000 class (AGI 34)	.0091	-.4292	-.0916
Federally taxable income in AGI in $4000 to $5000 class (AGI 45)	.0098	-.4920	-.1053

TABLE 1 (con't)

BASE	WEIGHT		
	ACIR Tax Rate	Multiple Regression (26 Independent Variables) Coefficient	Standardized Regression Coefficient (Beta)[a]
Federally taxable income in AGI in $5000 to $10,000 class (AGI 10)	.0120	-.0852	-.1357
Federally taxable income in AGI in $10,000 to $15,000 class (AGI 1015)	.0165	-.2530	.1114
Federally taxable income in AGI in $15,000 and over class (AGI 15)	.0274	.0594	-.6129
Total earnings (EARN)	.0017	.0490	.3537
Corporate wages and salaries (CORPPAY)	.0081	-.1226	-.7251
Retail sales (RETSALES)	.0037	.1560	.5208
Value of federally taxable estates (ESTATES)	.0324	.2006	.2024
Value of petroleum and natural gas production (PETROL)	.0419	.0407	.1494
Value of other mineral production (MINE)	.0047	.0801	.1471
Market value of nonfarm residential realty (RESID)	.0159	.0269	.4763
Value of farm realty and selected classes of farm personal property (FARM)	.0093	-.0001	-.0025
Earning in 56 type of business classes (proxy for business property value) (BPROP)	.0269	.0940	.6889
Estimated market value of vacant lots (VACANT)	.0114	.0088	.0377

TABLE 1 (con't)

$R^2 = .8276$

$\bar{R}^2 = 1 - (1-R^2)\ (\frac{N-1}{N-K}) = .6409$

Notes:

[a] $\beta i = bi\ (\frac{Si}{Sy})$

βi = Standardized regression coefficient

bi = Normal regression coefficients

Si = Standard deviation of independent variable (i)

Sy = Standard deviation of dependent variable (y)

Beta values indicate how many standard deviations the dependent variable will be changed by a one standard deviation change in the independent variable.

[b] The ACIR uses this base more than once in their calculations. I have simply listed the sum of the rates applied to this base.

[c] Adjusted Gross Income as defined by the Internal Revenue Service.

highest possible R^2 is not the goal--since, to the extent that tastes are correlated with tax base variables, part of fiscal capacity is in reality a function of taste rather than taxable resources--the fact that the ACIR measure explains only 44 percent of the variance in actual revenues raised cannot easily be dismissed. This small explanatory ability appears to be particularly suspect when it is considered that both the ACIR and the multiple regression method implicitly or explicitly define fiscal capacity as the tax revenues that would be raised by an average or normal effort upon each tax base. These norms (or estimated tax rates) are determined by estimating from existing relationships. It appears improbable that correct estimates of the norms of revenues expected from different bases when summed would lead to an estimate producing an R^2 of only .44 when actual tax collections are regressed upon it. (It is informative to note that when actual tax revenues are regressed upon per capita personal income alone, the R^2 is .57.)

As mentioned above, because the intercorrelations between many of the independent variables is large, the regression weights are in many cases suspect. For example, to determine the actual importance of income (or another basic tax base) from this massive equation would entail determining how much of the effect of other variables is due to the fact that they serve as close proxies for income (or the other basic bases). The correlation matrix (Appendix A) contains numerous r values between independent variables of greater than .8 and even .9. In this correlation matrix per capita personal income (PCPI) has been added to the ACIR data in order to provide a single variable income measure which can be related to the other variables.

Noticeably large r's between PCPI and various other independent variables include:

BPROP	--	.738
RETSALES	--	.805
RESID	--	.796
GSALES	--	.695
EARN	--	.949
SPIFIIT	--	.883
ESTATES	--	.720
CORPPAY	--	.720

Many similarly high r values exist for other combinations of independent variables (tax bases).

Some information can be gained, however, by noting the variables which have high explanatory value when all 26 variables are included in the analysis. The Beta values indicate that the variables which, moving within expected ranges, would be identified with the largest changes in actual tax collections are: earnings in 56 types of business classes (BPROP); retail sales (RETSALES); residential property values (RESID); general sales (GSALES); total earnings (EARN); state personal income minus federal individual income taxes (SPIFIIT); adjusted gross income falling in the $2,000 to $3,000 class (AGI23); and federally taxable estates (ESTATES). The most interesting common characteristic of these variables is that each, with the exception of AGI23 which directly represents income, has a simple correlation coefficient with per capita personal income of greater than .69. It appears that per capita personal income alone could serve as a reasonable proxy for all seven of these variables. This multiple regression result

in which all 26 tax bases are included, therefore, provides strong evidence for the hypothesis that underlying "basic" tax bases represent actual fiscal capacity, while many of the bases actually taxed are simply proxies through which the government reaches these bases.

The next obvious step of the analysis is to examine the results of estimating fiscal capacity using basic tax bases as explanatory variables. In attempting to empirically estimate fiscal capacity for the 50 states plus the District of Columbia, a straightforward methodology is used. An attempt is made to explain variations in actual state tax revenues raised per capita by variables representing income of residents, accumulated wealth of residents, and ability to tax the income and wealth of nonresidents as follows:

A) Resident income = Personal Income = (PI)

B) Resident wealth = Nonbusiness Property Values = (GPROP)

C) Ability to tax nonresidents = Airport Revenues = (AIRREV)

Because these variables alone would attempt to explain variances not only in the ability to raise tax revenues resulting directly from the resources represented, but also differences due to cost and taste factors, taste and cost variables have been added for normalization purposes as follows:

D) Cost = 1) Population (POP)
2) Density (DENS)

E) Taste = 1) Median years of education completed of adults over 25 years of age (EDMED)
2) Percentage of AGI going to persons in AGI classes below $4,000 (POORY)
3) Percentage of the population under age 15 and above age 65 (DEPEND)

The rationale for inclusion of each of these cost and taste variables is relatively straightforward. Population is to explain any economies or diseconomies of absolute size, while density is an attempt to explain economies or diseconomies due to density. It is assumed that more educated populations tend to demand more public services, that poor populations increase the demand for services, and that the old and young tend to necessitate more public expenditure in various areas such as health and recreation.

The results of this regression are presented in Table 2. These results are essentially as expected. Personal income is most important as an explanatory variable, as evidenced by the "t" value of 4.09 as well as the .57 Beta coefficient. It is of interest that the income variable is the only nontaste or cost variable which has significant explanatory value. The signs upon non-business property and airport revenues are both positive but the t statistics indicate that there is only weak evidence that the coefficients upon these two variables are different from zero. This equation implies that population size tends to increase per capita expenditures (diseconomies of scale) but that density tends to produce decreased expenditures per capita (economies of density). These results on economies and diseconomies at the statewide level, while interesting, provide little evidence to corroborate or refute the economies and diseconomies theories concerning localities. The results are interesting in and of themselves, however. Combining the results upon these two variables would support a theory of increasing costs of serving more people with density held constant, but decreasing costs of servicing a more dense population with population held constant. It would seem to be true that there are diseconomies of providing state-local services to larger than average populations but that these populations can be more cheaply served the closer together they are located.

TABLE 2

Results of Regression Analysis, Estimation of Fiscal Capacity with "Basic" Tax Bases, 1966-67

Dependent Variable	Constant Term	Independent Variables						
Actual tax revenues (TAXREV) (dollars per capita)		Personal income (PCPI) (dollar per capita)	Non-business property value[b] (PROP) (dollars per capita)	Airport Revenues (AIRREV) (dollars per capita)	Population (POP) 1966 (thousands)	Density (DENS) (pop./sq. mile)	Median years of school completed by adults over age 25 in 1960 (EDMED)	Adjusted gross income of poor as a percent of AGI (POORY)[c]
Regression coefficient	-189.07	.07	3.43	.22	.002	-4.24	22.24	4.35
t statistic[a]	- 2.76	4.09	.70	.53	1.30	-1.38	3.18	1.40
Beta coefficient		.57	.07	.05	.12	- .13	.40	.15

R^2 = .72 ($\bar{R}^2$ = .68)
F = 16.06 with 7 and 43 degrees (of freedom)
Number of observations = 51.

Source: 1970, U.S. Statistical Abstract, Department of Commerce, Bureau of the Census

[a]Coefficient divided by standard error of coefficient

[b]Sum of the three nonbusiness property bases used by the ACIR

[c]AGI less than $4,000, 1966

The coefficient upon the median school year variable is positive in sign and highly significant, and the percentage of income to the poor variable also has the expected sign and a "t" value suggesting significance at approximately the 17 percent level. These results were not unexpected.

Once this equation has been estimated, the estimation of state fiscal capacity is straightforward. Average values for each normalizing variable are substituted for actual values in each state so that the tax revenue estimated as a result of these variables for each state will be equal. Variations in the three fiscal capacity variables then lead to different estimates of fiscal capacity for the various states. These estimates are listed along with personal income, the 26 variable regression estimates, the actual ACIR weighted average method estimates, and actual tax revenues collected in 1966-67 in Table 3. For each of these possible alternative fiscal capacity measures, the rankings of states from highest to lowest are also provided in parentheses.

While after adjustment for degrees of freedom, the estimating equation explained .72 percent of the variance in actual tax revenues collected. The fiscal capacity estimates derived from the equation when regressed upon TAXREV are seen to explain 61 percent of variance. This explanatory power can be contrasted with that of 64 percent for the adjusted 26 variable equation which includes all the ACIR tax bases, and of only .44 percent for the actual published ACIR estimates. These coefficients of determination provide readily recognizable evidence for the fact that the 7 variable equation (including four normalizing variables) can explain more of the variance in actual taxing behavior than can the 26 variable equation estimated by including all ACIR tax bases; and that the fiscal capacity estimate derived from this economically reasonable equation--

TABLE 3

Actual Tax Revenues and Fiscal Capacity:
Estimates and Rankings, 1966-67

STATES (and rank by population size)[a]	PER CAPITA AMOUNTS				
	Personal Income (PCPI) Regression Estimate[b]	26 Variable Regression Estimate	3 Fiscal Capacity Variables Regression-Based Estimate	ACIR Estimate	Actual Tax Revenue (ATAXREV)
	Est. Rank	Est. Rank	Est. Rank	Est. Rank	Est. Rank
21 Alabama	229 (48)	181 (51)	241 (49)	219 (49)	194 (51)
51 Alaska	357 (9)	344 (9)	346 (11)	311 (23)	324 (20)
34 Arizona	274 (33)	326 (17)	283 (25)	298 (29)	325 (18)
32 Arkansas	224 (50)	226 (46)	242 (48)	241 (47)	200 (48)
1 California	360 (7)	382 (5)	354 (4)	387 (3)	417 (2)
31 Colorado	309 (20)	314 (24)	309 (19)	326 (16)	345 (10)
24 Connecticut	382 (2)	352 (8)	365 (3)	366 (6)	340 (13)
47 Delaware	367 (3)	326 (17)	353 (6)	384 (4)	345 (10)
40 District of Columbia	406 (1)	342 (10)	383 (1)	378 (5)	341 (12)
9 Florida	281 (30)	316 (23)	291 (30)	325 (18)	274 (33)
15 Georgia	259 (40)	252 (41)	264 (43)	249 (43)	230 (43)
41 Hawaii	329 (14)	391 (2)	327 (12)	310 (25)	417 (2)
43 Idaho	265 (38)	271 (35)	275 (35)	286 (35)	299 (27)
4 Illinois	367 (3)	365 (7)	354 (5)	357 (7)	301 (26)
12 Indiana	324 (15)	300 (27)	317 (22)	311 (23)	296 (29)
25 Iowa	316 (18)	330 (14)	320 (14)	325 (18)	337 (14)
29 Kansas	304 (24)	329 (16)	310 (18)	328 (15)	315 (22)
22 Kentucky	246 (45)	201 (48)	257 (42)	249 (43)	212 (46)
19 Louisiana	249 (43)	261 (38)	257 (44)	295 (31)	265 (37)
38 Maine	268 (36)	267 (37)	271 (41)	254 (42)	267 (36)
18 Maryland	336 (13)	330 (14)	329 (16)	317 (21)	326 (17)

TABLE 3 (con't)

STATES	PER CAPITA AMOUNTS				
	Personal Income (PCPI) Regression Estimate[b]	26 Variable Regression Estimate	3 Fiscal Capacity Variables Regression-Based Estimate	ACIR Estimate	Actual Tax Revenue (ATAXREV)
10 Massachusetts	343 (10)	374 (6)	331 (17)	305 (27)	371 (5)
7 Michigan	343 (10)	308 (26)	332 (13)	326 (16)	325 (18)
20 Minnesota	308 (22)	318 (22)	304 (25)	297 (30)	354 (8)
28 Mississippi	202 (51)	184 (50)	222 (51)	201 (51)	197 (49)
13 Missouri	300 (25)	253 (42)	300 (29)	304 (28)	263 (38)
42 Montana	282 (29)	300 (27)	293 (20)	330 (14)	308 (23)
35 Nebraska	308 (22)	334 (12)	316 (15)	344 (9)	270 (34)
48 Nevada	364 (5)	388 (3)	362 (2)	536 (1)	382 (4)
44 New Hampshire	299 (26)	278 (33)	305 (24)	343 (10)	278 (31)
8 New Jersey	359 (8)	323 (20)	345 (9)	335 (12)	324 (20)
37 New Mexico	259 (40)	243 (44)	269 (34)	293 (33)	269 (35)
2 New York	364 (5)	409 (1)	352 (7)	339 (11)	469 (1)
11 North Carolina	249 (43)	234 (45)	258 (45)	245 (45)	230 (43)
46 North Dakota	259 (40)	292 (30)	294 (37)	287 (34)	278 (31)
6 Ohio	322 (16)	284 (31)	317 (20)	314 (22)	257 (39)
27 Oklahoma	267 (37)	273 (34)	278 (38)	319 (20)	254 (40)
30 Oregon	309 (20)	282 (32)	309 (23)	331 (13)	334 (15)
3 Pennsylvania	314 (19)	296 (29)	307 (28)	285 (36)	282 (30)
39 Rhode Island	322 (16)	314 (24)	314 (27)	284 (37)	297 (28)
26 South Carolina	228 (49)	188 (49)	238 (50)	202 (50)	196 (50
45 South Dakota	263 (39)	270 (36)	280 (33)	284 (37)	303 (24)
17 Tennessee	245 (46)	209 (47)	254 (46)	243 (46)	212 (46)

TABLE 3 (con't)

PER CAPITA AMOUNTS

STATES	Personal Income (PCPI) Regression Estimate[b]	26 Variable Regression Estimate	3 Fiscal Capacity Variables Regression-Based Estimate	ACIR Estimate	Actual Tax Revenue (ATAXREV)
5 Texas	274 (33)	260 (39)	278 (39)	307 (26)	231 (42)
36 Utah	269 (35)	331 (13)	275 (31)	271 (40)	302 (25)
49 Vermont	279 (32)	325 (19)	280 (39)	275 (39)	328 (16)
14 Virginia	280 (31)	260 (39)	284 (36)	270 (41)	243 (41)
23 Washington	338 (12)	386 (4)	335 (8)	351 (8)	370 (6)
33 West Virginia	240 (47)	250 (43)	248 (47)	234 (48)	226 (45)
16 Wisconsin	298 (27)	322 (21)	298 (32)	294 (32)	363 (7)
50 Wyoming	293 (28)	337 (11)	301 (10)	441 (2)	347 (9)

[a]Ranked from largest to smallest, in parentheses.

[b]Based on the relationship ATAXREV = 35.23 + .09398 PCPI

holding revenues collected as a result of certain cost and taste factors at the average level in each state--explains a much higher proportion of variation than does the actual ACIR weighted average derived estimates. That the above is true, even though the variables used in the 7 independent variable equation obviously do a less than optimal job of capturing the effects of liquid wealth and nonresident taxable income, provides strong evidence for questioning the tax bases used by the ACIR for measuring fiscal capacity. That the actual ACIR estimates using the weighted average methodology do a much poorer job of explaining fiscal capacity than the regression estimates derived from the 26 ACIR variables is evidenced by the fact that the coefficient of determination (R^2) when actual tax collections are regressed on these actual ACIR estimates is only .44. That PCPI alone explains .57 of the variance appears to indicate that the use of income as a fiscal capacity measure for states is preferable to use of the ACIR estimates. Better estimates than income can be derived, however, by the methodology suggested here. The bases used are chosen on the basis of valid economic reasoning; are weighted by multiple regression analysis; and do not have weights which are of doubtful value due to the interrelationships among tax bases. These estimates also have the virtue of explaining a good deal more of the variation in actual tax collections than can either the ACIR estimates or income alone, and even of explaining virtually the same amount of variance as does the 26 independent variable equation (with its impossible to disentangle relationships among variables).

The estimates for the various states obtained by the use of the multiple regression technique with both 26 and 7 independent variables were

presented in Table 2, along with the ACIR estimates, actual tax revenues collected, and an estimate based upon regression of the dependent variable upon per capita personal income alone. A comparison of results derived from the various possible methods of estimating fiscal capacity can be made with the help of this table.

When actual revenues raised are compared to the different estimates of fiscal capacity in each of the states, the importance of the estimating method used can be recognized. If those states raising more or less actual revenues than their fiscal capacity estimates are defined as high and low effort states respectively, it can be noted that a change of fiscal capacity estimation method alone (i.e., using the same 26 tax bases) will move 20 of the 51 states (D.C. included) from either high or low effort into the opposite category. It is noteworthy that substitution of the regression method for the ACIR method causes 13 states to move from the low to the high effort category, while only 7 states move in the opposite direction. The ACIR method would define 32 states as low effort while the regression method places only 25 in this category. The implication is that the assumption that all states are able to tax every tax base at a national average rate leads to fiscal capacity estimates which are biased upward. This is exactly the result that would be expected based upon the hypothesis that various types of taxes tend to be substitute methods of taxing the same basic tax bases. Using average rates on every base in every state does not take into account that the use of one "nonbasic" base may tend to reduce the use of another. The obvious differences in the ranks of states in each of the five columns possibly provides the strongest evidence for the conclusion that the method of estimating fiscal capacity does matter, especially when such things as grant amounts are to be based upon the estimate used.

Appendix

Correlation Matrix

	GSALES	FUEL	TOBAC	BEV	UTIL	AMUSE	SPIFIT	AUTO	TRUCK	AGI2	AGI23	AGI34	AGI45
GSALES	1.00	.29	.53	.70	.72	.69	.58	.35	.05	.16	.13	.32	.14
FUEL		1.00	-.04	-.21	.28	.28	-.24	.59	.66	-.09	-.03	-.05	-.34
TOBAC			1.00	.76	.36	.22	.36	-.02	-.30	.15	.25	.47	.25
BEV				1.00	.45	.38	.54	-.19	-.33	.18	.14	.38	.29
UTIL					1.00	.30	.56	.31	.04	-.06	-.03	.07	-.06
AMUSE						1.00	.21	.19	.05	-.14	.02	.07	-.06
SPIFIT							1.00	.16	-.29	.27	.17	.25	.29
AUTO								1.00	.28	.08	.08	-.06	-.11
TRUCK									1.00	-.02	-.17	-.16	-.39
AGI2										1.00	.43	.59	.46
AGI23											1.00	.67	.54
AGI34												1.00	.59
AGI45													1.00
AGI510													
AGI1015													
AGI15													
PCPI													
EARN													
CORPAY													
RETSALES													
ESTATES													
PETROL													
MINE													
RESID													
FARM													
BPROP													
VACANT													

	AGI510	AGI1015	AGI15	PCPI	EARN	CORPAY	RETSALES	ESTATES	PETROL	MINE	RESID
GSALES	.50	.49	.54	.70	.57	.39	.88	.51	-.07	.02	.63
FUEL	-.13	-.17	-.34	-.22	-.30	-.14	.17	-.12	.42	.39	-.12
TOBAC	.47	.27	.42	.47	.35	.30	.52	.52	-.09	-.19	.49
BEV	.35	.30	.58	.63	.51	.19	.59	.57	-.14	-.16	.56
UTIL	.55	.53	.54	.66	.51	.39	.69	.50	.22	.20	.57
AMUSE	.11	.25	.24	.28	.24	.29	.34	.19	-.07	.18	.40
SPIFIT	.68	.75	.81	.88	.85	.62	.69	.61	-.16	-.21	.70
AUTO	.33	.28	-.00	.13	.10	.26	.43	.15	.01	.06	.28
TRUCK	-.39	-.36	-.49	-.35	-.38	-.49	-.04	-.42	.42	.38	-.44
AGI2	.27	.01	.06	.19	.12	-.02	.32	.17	-.18	-.29	-.01
AGI23	.35	.16	.18	.19	.17	.33	.29	.42	-.15	-.27	.16
AGI34	.45	.07	.17	.28	.20	.23	.45	.40	-.19	-.30	.18
AGI45	.33	.19	.31	.34	.30	.30	.32	.49	-.33	-.39	.29
AGI510	1.00	.76	.64	.77	.70	.74	.69	.65	-.27	-.25	.66
AGI1015		1.00	.85	.86	.92	.87	.62	.51	-.18	-.15	.76
AGI15			1.00	.93	.91	.73	.63	.72	-.17	-.29	.80
PCPI				1.00	.95	.72	.81	.72	-.19	-.23	.80
EARN					1.00	.76	.69	.56	-.21	-.20	.74
CORPAY						1.00	.76	.59	-.26	-.21	.67
RETSALES							1.00	.51	-.19	-.20	.66
ESTATES								1.00	-.18	-.33	.71
PETROL									1.00	.37	-.22
MINE										1.00	-.23
RESID											1.00
FARM											
BPROP											
VACANT											

	FARM	BPROP	VACANT
GSALES	.07	.35	.44
FUEL	.53	-.14	-.13
TOBAC	-.32	.28	.58
BEV	-.32	.17	.57
UTIL	.07	.47	.19
AMUSE	-.08	.17	.34
SPIFIT	-.20	.64	.27
AUTO	.30	.25	.07
TRUCK	.83	-.45	-.22
AGI2	.21	.01	-.04
AGI23	-.17	.30	.14
AGI34	-.11	.23	.08
AGI45	-.29	.31	.04
AGi510	-.23	.77	.18
AGI1015	-.35	.87	.23
AGI15	-.44	.74	.29
PCPI	-.26	.74	.29
EARN	-.35	.77	.27
CORPAY	-.51	.97	.13
RETSALES	.07	.52	.33
ESTATES	.33	.60	.20
PETROL	.27	-.16	-.10
MINE	.20	-.15	-.04
RESID	-.42	.66	.51
FARM	1.00	-.46	-.27
BPROP		1.00	.06
VACANT			1.00

FOOTNOTES

[1]Advisory Commission on Intergovernmental Relations (ACIR), Measuring the Fiscal Capacity and Effort of State and Local Areas, (Washington, D.C.: U.S. Government Printing Office, March 1971) p. 1.

[2](1971) LA 29820 (Super. Ct. No. 938254).

[3]ACIR, Measures of State and Local Fiscal Capacity and Tax Effort: A Staff Report, (Washington, D.C.: U.S. Government Printing Office, October 1962).

[4]Allan D. Manvel, "Differences in Fiscal Capacity and Effort: Their Significance for a Federal Revenue-Sharing System," National Tax Journal, Vol. XXIV, No. 2, June 1971 and ACIR, Measuring the Fiscal Capacity and Effort of State and Local Areas, (Washington, D.C.: U.S. Government Printing Office, March 1971).

[5]I wish to thank Allan D. Manvel, Jacob Jaffe and John Shannon of the ACIR for aiding me in obtaining an identical set of data to the one used in the 1971 study.

[6]The data problems of reestimating the local fiscal capacities from ACIR data are so great that no attempt is made. It appears, however, that the local estimates suffer from the same afflictions as do those for states because the estimating procedure is in essence identical. For a methodology for estimating local fiscal capacity see John S. Akin, "Estimation of Local Fiscal Capacity," (Ph.D. dissertation, University of Michigan, 1971).

[7]Taxable income is broken down into seven classes, and taxable property is represented by four separate bases (or proxies).

[8]For example, the ACIR fiscal capacity of a state A having only income and residential property would be:

$$\text{ACIR Fiscal Capacity} = \frac{\text{Sum over the nation of state-local income tax revenues}}{\text{Sum over the nation of taxable income}} \text{ (Taxable income of state A)}$$

$$+ \frac{\text{Sum over the nation of state-local residential property taxes}}{\text{Sum over the nation of residential property}} \text{ (Residential property of state A)}$$

[9]Corrected coefficient of determination $= \bar{R}^2 = 1-(1-R^2)\left(\frac{N-1}{N-K}\right)$

REFERENCES

Advisory Commission on Intergovernmental Relations. Measures of State and Local Fiscal Capacity and Tax Effort: A Staff Report. Washington, D.C.: U.S. Government Printing Office, October, 1962.

_____. Measuring the Fiscal Capacity and Effort of State and Local Areas. Washington, D.C.: U.S. Government Printing Office, March, 1971.

Akin, John S. "Estimation of Local Fiscal Capacity." Ph.D. dissertation, University of Michigan, 1971.

Bowman, John H. "City Suburban Differentials in Local Government Fiscal Effort: A Comment." National Tax Journal, Vol. XXII, No. 3 (September, 1969).

Bowman, John H.; Hovey, Harold A.; and Stocker, Frederick D. Fiscal Equity: A Study of Comparative Revenue Payments, Fiscal Capacity, and Public Expenditure Benefits and Needs in Seven Areas in Missouri. Part I: Summary and Conclusions. Columbus, Ohio: Battelle Memorial Institute, January, 1970.

_____. Final Report on Fiscal Equity: A Study of Comparative Revenue Payments, Fiscal Capacity, and Public Expenditure Benefits and Needs in Seven Areas in Missouri. Part II. Columbus, Ohio: Battelle Memorial Institute, January 1970.

Brazer, Harvey E. City Expenditures in the United States. Occasional Paper No. 66. New York: National Bureau of Economic Research, Inc., 1959.

_____. "Federal, State, and Local Responsibility for Financing Education," In Economic Factors Affecting the Financing of Education. Edited by Roe L. Johns et al., Vol. II. Gainesville, Fla.: National Educational Finance Project, 1970.

_____, ed. Essays in State and Local Finance. Michigan Governmental Studies No. 49. Ann Arbor: Institute of Public Administration, The University of Michigan, 1967.

Brazer, Harvey E.; Akin, John S.; Auten, Gerald E.; and Cross, Cynthia S. "Fiscal Needs and Resources: A Report to the New York State Commission on the Quality, Cost and Financing of Elementary and Secondary Education" November, 1971. Mimeographed.

_____. Fiscal Needs and Resources: An Interim Report to the New York State Commission on the Quality, Cost and Financing of Elementary and Secondary Education December 10, 1970. Mineographed.

Chism, Leslie L. "The Economic Ability of the States to Finance Public Schools." New York: Teachers College, Columbia University, 1936.

Cornell, Francis G. "A Measure of Tax Paying Ability of Local School Administrative Units." New York: Teachers College, Columbia University, 1936.

_____. "A Summary Report on an Analysis of New York State School Aid Correction." Prepared for the University of the State of New York, The State Education Department. White Plains: Educational Research Services, Inc., December, 1966.

Cornell, Francis G., and Johns, Roe L. "Alabama's New Index of Local Ability to Pay for Education." The School Executive (June, 1941).

Cubberly, E.P. "School Funds and the Apportionment." New York: Teachers College of Columbia University, 1905.

Grunloh, James J. "Alternate Measures of Fiscal Capacity." Working Paper DRA 6. St. Louis, Mo.: Institute for Urban and Regional Studies, Washington University, August, 1967.

Hedlund, Paul A. "A State Aid Correction for the Added Costs of Operating Small Schools." Albany: University of the State of New York, State Education Department, October, 1965. Mimeographed.

Hogan, Lloyd L. Measurement of the Ability of Local Governments to Finance Local Public Services. Albany: The University of the State of New York, The State Education Department, Bureau of Educational Finance Research, May, 1967.

Landreth, Harry. "The Measurement of Local Fiscal Capacity." Ph.D. dissertation, Harvard University, 1960.

Mushkin, Selma J., and Cotton, John F. "Functional Federalism: Grants-in-Aid and PPB Systems." Washington, D.C.: State-Local Finances Project of the George Washington University, November, 1968.

National Tax Association. "Preliminary Report of the Committee Appointed by the National Tax Association to Prepare a Plan of a Model System of State and Local Taxation," Proceedings of the National Tax Association, 1919. New York: National Tax Association, 1919.

Newcomer, Mabel. "An Index of the Tax Paying Ability of State and Local Governments." New York: Teachers College, Columbia University, 1935.

Norton, John K. The Ability of the States to Support Education. Washington, D.C.: The National Education Association, 1926.

_____. "Major Issues in School Finance." Research Bulletin of NEA. Vol. IV, No. 5. Washington, D.C.: The National Educational Association, 1926.

Norton, John K., and Norton, Margaret Alltucker. "Wealth, Children, and Education." New York: Teachers College, Columbia University, 1937.

Oppermann, E.B. "The Potential Usefulness of Uniform Tax Burden Distributions as Measures of the Tax Capacities and Tax Efforts of State and Local Governments: An Empirical Study." Ph.D. dissertation, Indiana University, June, 1965.

State of New York, Department of Audit and Control. Atlas of School Districts and Units of Local Government. Albany: 1957.

_____. Consitutional Limitations on Municipal Debt. Comptroller's Studies for the 1967 Constitutional Convention. Study No. 5. Albany: June, 1967.

_____. Financial Data for School Districts, Year Ending June 30, 1969. Albany: 1970.

_____. Financial Data for School Districts, Year Ending June 30, 1968. Albany: 1969.

_____. 1959 Tax Atlas of New York State. Comptroller's Studies in Local Finance. No. 2. Albany: 1961.

_____. Tax Limits of Counties, Cities and Villages, 1963-67. Comptroller's Studies for the 1967 Constitutional Convention. Study No. 1. Albany: 1961.

_____. Tax Limits of School Districts in Cities, 1952-1967. Comptroller's Studies for the 1967 Constitutional Convention. Albany; February, 1967.

State of New York, Department of Audit and Control, Division of Municipal Affairs, Bureau of Municipal Research and Statistics. State Aid to Local Government, 1969. Albany: September, 1969.

State of New York, Department of Audit and Control, Division of Municipal Affairs, Bureau of Research and Statistics. E.D.P. Code Manual: Counties, Cities, Towns, Villages in New York State. Rev. ed. Albany: September, 1965.

_____. Index to the Public Schools and Mail Directory of Local Governments. Albany: October, 1969.

State of New York, Department of Audit and Control, Office of the State Comptroller. Annual Report, 1969. Albany: n.d.

_____. Annual Report, 1968. Albany: n.d.

State of New York, Department of Taxation and Finance. Annual Report, '67-68, The New York State Tax Commission, The Division of the Treasury and the Division of the Lottery. Albany: n.d.

State of New York, Office for Local Government. Local Government in New York State. Albany: April, 1970.

Stollar, Dewey H., and Boardman, Gerald. Personal Income by School Districts in the United States. Gainesville, Fla.: National Educational Finance Project, 1971.

Strayer, G.D. and Haig, R. M. The Financing of Education in the State of New York. Vol. 1. Educational Finance Inquiry. New York: Macmillan, 1923.

Studenski, Paul. Measurement of Variations in State Economic and Fiscal Capacity. Bureau Memorandum No. 50. Washington, D.C.: The Social Security Board, 1943.

Swanson, Austin D. The Effect of School District Size upon School Costs: Policy Recommendations for the State of New York. Buffalo: The Western New York School Study Council, 1966.

Tax Institute, Inc. Financing Education in the Public Schools. Princeton: Tax Institute, Inc., 1956.

_____. The Limits of Taxable Capacity. Princeton: Tax Institute, Inc., 1953.

U.S. Bureau of the Census. Census of Governments, 1967. Vol. 7: State Reports, No. 32: New York. Washington, D.C.: U.S. Government Printing Office, 1970.

_____. 1970 Census of Population. Final Population Counts, Advance Report, New York State, PC(VI)-34 (January, 1971).

U.S. Congress, Joint Economic Committee. State and Local Public Facility Needs and Financing. Vol. I: Public Facility Needs. Study prepared for the Subcommittee on Economic Progress of the Joint Economic Committee, Congress of the United States, 89th Cong., 2d Sess. Washington, D.C.: U.S. Government Printing Office, December, 1966.

U.S. Department of Commerce, Bureau of the Census. Governmental Finances in 1967-68. Washington, D.C.: U.S. Government Printing Office, 1969.

U.S. Department of Health, Education, and Welfare, Office of Education. Public School Finance Programs of the United States. Misc. No. 22. Washington, D.C.: U.S. Government Printing Office. n.d.

The University of the State of New York, the State Education Department. Education Statistics, New York State, Prepared Especially for Members of the Legislature, January, 1970. Albany: January 7, 1970.

The University of the State of New York, The State Education Department, Bureau of Educational Finance Research. Analysis of School Finances, New York State School Districts, 1968-69. Albany: May, 1970.

_____. Analysis of School Finances, New York State School Districts, 1967-68. Albany: May, 1969.

_____. Two Alternative Measures of Density of the Major School Districts in New York State. Albany: July, 1966.

_____. Understanding Financial Support of Public Schools, 1970-71. Albany: September, 1970.

The University of the State of New York, The State Education Department, Bureau of Finance and Research. Federal Aid Paid to New York School Districts: An Analysis, 1966-67. Albany: May, 1969.

The University of the State of New York, The State Education Department, Division of Educational Finance. A Guide to Programs of State Aid for Elementary and Seconday Education, 1968-69. Albany: January, 1969.

_____. State Aid for Elementary and Secondary Education in New York State as Apportioned in 1967-68. Albany: March, 1969.

The University of the State of New York, The State Education Department, Information Center on Education. Annual Education Summary, New York State, 1967-68: Statistical and Financial Summary of Education in New York State for the Year Ending June 30, 1968. Albany: n.d.

Wueller, P.H. Fiscal Capacity of the States: A Source Book. Washington, D.C.: Social Security Board, Bureau of Research and Statistics, September, 1937.