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ESTIMATION OF LOCAL FISCAL CAPACITY

by

John Stephen Akin

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Economics)
in The University of Michigan
1971

Doctoral Committee:

Professor Harvey E. Brazer, Chairman
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PREFACE

This dissertation was undertaken as part of research effort for a joint study financed by the New York State Commission on the Quality, Cost and Financing of Elementary and Secondary Education and directed by Professor Harvey E. Brazer. I wish to thank the numerous people in New York who were kind enough to provide information and aid. Especially helpful were John Pollack, Robert Goettel, and Seymour Sacks.

As is true in any effort to produce something of value much of what has resulted is a direct consequence of what I have learned from others. I especially wish to thank Robin Barlow, Sidney Winter, Richard Porter, and Robert Stern.

I also wish to acknowledge the aid and insights obtained from my colleagues in the New York State study: Gerald Auten, Cynthia Cross, and Peggy Kilpela (who also typed and generally made legible this dissertation).

Rightfully belonging in several of the above categories of people to whom I am indebted, but deserving special recognition because of their unique contributions, are the members of my dissertation committee: Bill Neenan, Peter Steiner, and Jack Walker. Most deserving of acknowledgment and praise is my Chairman, Harvey Brazer, whose efforts on my behalf have been too numerous to attempt to mention.

The last people to whom I wish to express my appreciation and love are those without whom this effort would have little meaning: my parents, my wife Ella, and my son Stephen.

I must end this statement of acknowledgment with a paraphrase of that customary ending. I assume all responsibility for remaining errors, but only share the responsibility for those parts which are not in error.

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CHAPTER I

INTRODUCTION

The ability of governmental units to raise revenues in order to finance public services--fiscal capacity--is an abstraction which cannot be measured in any straightforward "acceptable-to-all" manner. That various attempts to measure fiscal capacity have been and still are being made would seem to indicate that some importance is attached to the attainment of the ability to measure fiscal capacity. The importance of a reliable and usable fiscal capacity measure derives from various policy-oriented applications.

The most frequent use of fiscal capacity measures is in formulas for the distribution of aid from higher to lower levels of government. When it is considered desirable by the electorate and/or their elected representatives to provide aid based upon an intergovernmental equity ideal such as "more aid should go to those units with the greatest needs for aid relative to their own ability to pay for these needs locally," an index of the relative ability of the possible aid receiving units to finance public services from their own sources is necessary. (A measure of "needs" is also necessary, but an in-depth discussion of that topic is beyond the scope of this thesis.) The federal government of the United States is now discussing revenue sharing from the federal to the state and local levels. Some of the plans being brought forth have as a goal the providing of funds to those states and localities most in "need" of funds.

Better ability to measure fiscal capacity, especially at the local level--at the state level there appears to be a consensus among economists that personal income is a satisfactory fiscal capacity measure--would enhance the probability that a program of this type would in reality provide the money to those least able to raise it themselves. Numerous existing federal and state aid programs, especially state aid to education programs, attempt to estimate local fiscal ability in order to use it as a criterion for aid distribution. The simple fact that fiscal capacity measures are so widely used in aid programs tends to emphasize the importance of the fiscal capacity measures used. That the government itself considers fiscal capacity estimation an important problem can be inferred from the fact that twice in the past ten years the U.S. Government-created Advisory Commission on Intergovernmental Relations has released major studies on this topic.[1]

That the measurement of the capacity of local governmental units, especially school districts, to raise revenues through taxation is of utmost importance is also evidenced by 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 wealth in expenditures for public education illuminates the necessity to measure this wealth efficiently. Although the California

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[1]Advisory Commission on Intergovernmental Relations, Measures of State and Local Fiscal Capacity and Tax Effort: A Staff Report (Washington, D.C.: Advisory Commission on Intergovernmental Relations, October, 1962) and ACIR, Measuring the Fiscal Capacity and Effort of State and Local Areas (Washington, D.C.: U.S. Government Printing Office, March, 1971).

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

court in this decision implicitly accepts taxable property values as a legitimate measure of district wealth or fiscal capacity, 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 as I interpret it--equalization of capacity of districts to fulfill the needs of students given equal tax effort--is to be realized. Before we begin earnest discussions into the possibility of basing far-reaching policy decisions upon a desire to remove discrimination in the provision of public goods on the basis of wealth or taxable resources of localities, we must attempt to enhance our ability to define and measure local ability to raise government revenues (or local fiscal capacity). This dissertation has as its primary goal to derive a local fiscal capacity measure which is superior to existing measures. The actual empirical analysis is done for a sample of school district units in the State of New York.

Past fiscal capacity measures have been based mainly upon measures of income, taxable property, or combinations of these two. A critical review of these past efforts allows the shortcomings and strengths of the various alternatives to be made explicit. Based upon the findings of this review a decision is made to use multivariate regression analysis as a method of weighting median family income and the per capita levels of five types of real property[3] to derive an index of per capita local fiscal capacity.

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[3]Seasonal, residential, commercial, industrial, and other real property.

The main hypotheses upon which this decision is based are that both income and real property wealth are important determinants of local fiscal capacity, and that real property wealth subdivided into types explains the variance in local fiscal capacity better than the total value of real property. That income and real property wealth are important determinants is tested by examination of the coefficients and "t" values when per capita local revenue is regressed upon median family income and total per capita real property value. That subdivision of property by types provides "better" explanatory power is tested by comparison of the R^2's, coefficients, and "t"'s in separate estimating equations in one of which total per capita real property value in the aggregate is used as an independent variable and in the other of which the per capita values of five property types[4] are each used as explanatory variables. The six independent variables are also tested for absence of high correlation with possible "need" or demand indicating variables not used in the estimation process. The absence of high correlation of the variables used to estimate fiscal capacity with variables of this type is a necessary condition if the estimation process is to measure only capacity to finance public services, not the "need" or demand for public services. Since local fiscal capacity obviously cannot be used as the dependent variable in the regression analysis, actual per capita revenue collections is used as a proxy. Using actual collections as the dependent variable determines that the regression coefficients will represent sample-wide "norms" for the relationship between each independent variable and actual revenue collections of local governments. In essence fiscal capacity

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[4]See footnote 3 supra.

estimated by this method is the "normal" or expected level of actual local revenue collections for all local governments comprising a school district area given its level of median family income and per capita levels of the five real property types. Because of the nature of the measure it is possible for districts to tax at levels which raise revenues in excess of fiscal capacity. Capacity as defined is therefore more analogous to the "efficient" operating level of output of a plant, in the theory of the firm, than to an absolute maximum that the plant could produce.

The local fiscal capacity index is empirically estimated using data from 104 school district areas in New York State. The result measures the capacity of all local units in a given geographic area to raise revenues for public purposes. Fiscal capacity is defined in this manner because of the belief that an attempt to measure anything except total possible public revenue collections from a given set of resources would cause the research to rest on arbitrary decisions. Measuring dollars that can be raised for education without considering dollars raised from the same tax bases for other purposes essentially defines fiscal capacity for education as that percentage of total fiscal capacity which the democratic process in the area allocates to education. It is my contention that ability to raise revenues given taxable resources cannot be satisfactorily divided among functions. Total capacity resulting from given resources is the only feasible capacity to measure. It is, however, possible, once the total local fiscal capacity is measured, to estimate the amount of this capacity that should be used for other public purposes and to define the residual after this "needed" amount is spent as fiscal capacity available for education (or analogously for any other public purpose). In the latter parts of this dissertation a method for measuring

"need" for other public services is adopted from another study[5] and used to determine the amount of fiscal capacity available for education in the 104 sample districts. One indirect result of this attempt to derive fiscal capacity for one function is my realization that not only do we need better fiscal capacity measures but also further research in the measurement of public "needs."

Based upon the results of the above analyses and upon the actual allocation of state and federal aid funds some conclusions about the equity aspects of the prevailing aid systems are suggested. A suggestion is also made concerning what elements aid formulas should and should not contain if equity among governmental units is a goal.

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[5]Harvey E. Brazer et al., 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).

CHAPTER II

PAST EFFORTS

Many efforts have been made in the past to measure fiscal capacity. These efforts can essentially be characterized as falling under three classifications: property value measures, income measures, and measures using a combination of factors, usually including income and property values as the main factors. The combination measures include those based on specific tax structures such as the ACIR's representative tax system[1] and several measures based upon the Model Tax Plan of the National Tax Association.[2]

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[1]Advisory Commission on Intergovernmental Relations, Measures of State and Local Fiscal Capacity and Tax Effort and ACIR, Measuring the Fiscal Capacity and Effort of State and Local Areas. The 1971 report attempts to use essentially the same method as the earlier report on a state-wide basis for measuring the fiscal capacity of local areas. The only local units for which fiscal capacity is estimated are 218 SMSA's and 747 counties. A measure of fiscal capacity for units smaller than the county is not attempted, probably because of data collection problems. It is interesting that national average rates are used by the ACIR even in estimating local fiscal capacity. It would seem that, even if one accepts the ACIR method, it would be necessary to use the tax bases and rates prevalent in the state itself in estimating local fiscal capacity, since the tax bases used in states do vary considerably. For instance, gambling taxation is very important in Nevada, yet over the nation the average tax levy on wagering will not be very high.

[2]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), pp. 401-470.

Property Value Measures

Early measures used by educators attempt to measure the fiscal capacity of local units by using simple assessed valuation of property.[3] It soon became evident, however, that the problems of obtaining equal assessment in different areas, and of the ability of local units to manipulate the assssed value measure if it were used for aid determination purposes, led to the abandonment of the use of assessed valuations as a measure of fiscal capacity.

After this approach had been abandoned several individuals, again mainly educators, attempted to derive measures which approximated assessed property values but did not depend upon the accuracy of assessors or the honesty of local units in reporting actual assessed valuations. Cornell in 1936 used an index of fiscal capacity based upon six economic series which he believed to be closely related to actual property values.[4] The six indicators he used were population, retail sales, motor vehicle registrations, production, number of income tax returns, and postal receipts. Cornell, along with Johns, designed a similar measure for the State of Alabama, to be used in measuring county ability to pay for education.[5] Norton in 1926 used a similar measure for estimating the ability of states

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[3] E. P. Cubberly, School Funds and Their Apportionment (New York: Teachers College of Columbia University, 1905) and W. T. Harris, "The Political Economy of School Finances," Educational Review, Vol. XXIX (May, 1905), pp. 486-509.

[4] Francis G. Cornell, A Measure of Tax Paying Ability of Local School Administrative Units (New York: Teachers College, Columbia University, 1936).

[5] Francis G. Cornell and Roe L. Johns, "Alabama's New Index of Local Ability to Pay for Education," The School Executive (June, 1941), pp. 22-23.

to support education.[6] He more or less arbitrarily chose and weighted ten economic series. Norton's method was perhaps superior to the others, however, because his economic series were designed to represent not only wealth but also income. But the main problem that confronts all measures based upon more than one fiscal capacity base was still present: how to choose and weight the bases used in formulating the fiscal capacity estimate.

Updegraff in New York State in 1922 made the suggestion that payments to state and local units be based upon need and fiscal ability and that the measure of fiscal ability be based upon true taxable wealth, not assessed valuation.[7] From about this time in history to the present, writers on fiscal capacity, almost without exception, have suggested the use of either state or federally equalized property values, when property values are to be used for fiscal capacity estimates, alone or in an index. But even if property values can be equalized properly, the use of property values alone as a measure of fiscal capacity is obviously deficient. While property values do represent wealth they do not effectively represent the ability to pay taxes. A district with much taxable wealth and little income may have a much smaller ability to pay taxes than a similar district whose residents have higher incomes. The situation rarely occurs in which people are selling their property in order to pay taxes. It is a simple fact that taxes are paid out of present income in almost all cases. Therefore, even though property value is a good first approximation

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[6] John K. Norton, "Major Issues in School Finance," Research Bulletin of NEA, Vol. IV, No. 5 (Washington, D.C.: National Education Association, 1926).

[7] Harlan Updegraff, Rural School Survey of New York State (Ithaca: Joint Committee on Rural Schools, 1922).

to fiscal capacity, and, as the most widely available estimate of taxable wealth and the taxpaying ability resulting from such wealth accumulations, should be an element included in any measure of fiscal capacity, property value alone simply is not a sufficient fiscal capacity index.

Income Measures

Early in the 1940's estimates of state income payments began to be published by several organizations. As faith in these estimates grew, many writers started to examine the feasibility of using income payments as a measure of fiscal ability. The Social Security Board in 1937 came out with a publication examining the use of income as a fiscal capacity measure.[8] The Department of Commerce in 1939 began the federal government's publication of income payments estimates, probably due in part to the interest of the Social Security Board in these statistics. D. S. Gehrig, writing for the Social Security Bulletin in 1940, suggested that income payments are the best measure of fiscal capacity for states and that this measure should be used in distributing federal grants.[9] Paul Studenski in 1943 also came to the conclusion that "per capita income affords a workable index of both these capacities [economic capacity and fiscal ability], and the various criticisms advanced against its use for these purposes either relate to shortcomings which can readily be corrected or presume an ideal precision which is far too difficult to attain and is

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

[9] D. S. Gehrig, "The Financial Participation of the Federal Government in State Revenue Programs," Social Security Bulletin, Vol. III, No. 1 (January, 1940).

not warranted in an index."[10] Studenski did, however, suggest that in measuring state fiscal ability a better estimate might be produced if estimates of per capita income produced were developed and combined in the same index with per capita income received.[11] Studenski, however, did not attempt this undertaking.

Per capita income as an estimate of local fiscal capacity has been much less frequently suggested. One problem with using the income approach is that data are usually available only on a county or larger unit basis. Landreth, in a dissertation written at Harvard University, suggested that income is the best measure of local fiscal capacity.[12] Oppermann, in a dissertation at Indiana University, advised that the distribution of income and, therefore, the assumed distribution of the burden of various taxes among the income classes should be the measure used in determining local fiscal capacity.[13]

The real problem with using income alone as a measure of local fiscal capacity results from the very fact that a local measure is desired. A measure of the income of residents will not take into account the existence of commercial and industrial property or the volume of trade and economic activity occurring in a local area. Firms located in the area as well as individuals (and firms) who do not live in the area demand

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[10]Paul Studenski, Measurement of Variations in State Economic and Fiscal Capacity, Bureau Memorandum No. 50 (Washington, D.C.: The Social Security Board, 1943), p. 32.

[11]Ibid., pp. 75-76.

[12]Harry Landreth, "The Measurement of Local Fiscal Capacity" (unpublished Ph.D. dissertation, Harvard University, 1960).

[13]E. B. Oppermann, "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" (unpublished Ph.D. dissertation, Indiana University, June, 1965).

public services and should be expected to help pay for public services. A fiscal capacity measure for local units which takes into account only the income of residents will be both inequitable and misleading. Because a community is mainly a residential suburb it may have high income, but it will not necessarily have a higher fiscal capacity than the communities in which its residents work and shop. In a unit as large as a state all types of activities can be expected to exist because of the size of the unit. States which are almost totally residential, commercial, or industrial do not exist. For this reason income alone can be said to be a good measure of state fiscal capacity. (The use of income alone will tend to reflect the total level of economic activity, because the state is large enough to contain the area in which most economic activities of the service-demanders take place. That individuals pursue activities in more than one state is felt to be a minor problem because crossovers occur in both directions and all types of economic activities occur in all states.) Income, however, is a very poor measure of <u>local</u> fiscal capacity. While it is income from which taxes must ultimately be paid, it is not simply the income of residents and/or workers in a local unit that matters. The income of individuals who use services while shopping, vacationing, or seasonally residing in a unit helps to determine the fiscal capacity of the unit. No income measure alone can capture this aspect of fiscal capacity.

Combination Measures

Although neither property values nor income alone provides a satisfactory measure of fiscal capacity, there are attempted measures of fiscal capacity which try to combine both income and property in indices.

Strayer and Haig, in a study of fiscal capacity of New York counties in 1923, used estimates of income and wealth in measuring fiscal capacity.[14] Norton in 1926 also suggested a measure reflecting both income and wealth for state fiscal capacity.[15] The problem of weights was handled very unsatisfactorily in both of these studies. Strayer and Haig used taxable income plus one-tenth of full property value. Norton used the same weighting scheme, and admitted that these weights were arbitrarily chosen. Lloyd Hogan used multivariate regression analysis to weight income and total property value in his study for the State of New York.[16] The main shortcoming of Hogan's approach was not that his weights were poorly chosen but that he did not divide total property into types according to usage.

The types of property in a unit have a strong effect on the ability to raise tax revenues, due to the "price" effect that non-residential property exerts upon taxpayer-voters' behavior. Dividing property in such a way that industrial, commercial, and seasonal property are given weights according to their individual relationships to revenue actually raised allows the regression equation to capture the effects of varying concentrations of these types of property upon fiscal ability. Commercial and industrial firms generally sell at least part of their goods and services to non-residents who do not vote in the community. Seasonal property is

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[14] G. D. Strayer and R. M. Haig, The Financing of Education in the State of New York, Educational Finance Inquiry, Vol. I (New York: MacMillan, 1923).

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

[16] Lloyd L. Hogan, 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).

often owned by outsiders or used by outsiders on a rental basis. Taxes on all types of non-residential property lead to shifting of tax burdens outside the community, or to the belief on the part of residents that this shifting occurs. If, because of this shifting or belief in this shifting, taxing behavior in a community differs from that of a community with similar income and total taxable property value, but with a different mix of property types, the fiscal capacity can be said to differ in communities according to the makeup of the total property rolls. We would be extremely surprised if this result did not show up in empirical analysis. In the sense that measuring total property value can be said to be "counting the community's bricks" the use of total property divided by types can be said to be an attempt to also note "what the bricks do." It is an attempt not only to measure the real wealth of the community but also to differentiate the types of real wealth as to their public revenue raising capacities.

Several studies attempted to put equal weights on actual existing tax bases in localities in order to come up with an approximation of local fiscal capacity. The most difficult problem with the use of this method is selecting the bases and the rates to be used in the index. Arvid Burke, in his special staff study for the State of New York, suggested that the taxes included in the fiscal ability measure should be only those taxes which were both legal and practical.[17] He evaluated property, income, and retail sales as indicators of fiscal capacity, using ten criteria: reliability, currentness, applicability, universality, validity, equity,

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[17]Arvid J. Burke, "Local Fiscal Ability," Special Staff Report in State of New York, Joint Legislative Committee on School Financing, Final Report, Legislative Document (1963), No. 11 (Albany: March 12, 1963). This is a staff study for the Diefendorf Committee.

objectivity, feasibility, acceptability, and economy. Burke did not recommend any single indicator but did point out that property values stand up reasonably well as a fiscal capacity measure, using the above criteria for evaluation. Newcomer in 1935 estimated fiscal capacity using a modified version of the Model Tax Plan published by the National Tax Association in 1933.[18] The taxes included in this fiscal capacity measure were personal income, real property, business net income, corporate organization, gross receipts from petroleum and natural gas, and stocks transfer taxes. To avoid the weighting problem Newcomer simply gave each series equal weight. Chism did a similar study, but in no case modified the taxes used by the National Tax Association in the Model Tax Plan.[19] Norton, through multivariate regression analysis, estimated the Newcomer index by using ten economic indicators.[20] What Norton derived, therefore, is an estimating equation to estimate a model tax structure. Since the model tax structure itself is based upon a more or less arbitrary selection of the "ideal" bases and rates, a second best approximation of this index should perhaps be called a "second best of second bests."

Probably the most widely accepted fiscal capacity measure is that of the Advisory Commission on Intergovernmental Relations, first released in October, 1962.[21] Although the measures in the 1962 report really are

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[18]Mabel Newcomer, An Index of the Tax Paying Ability of State and Local Governments (New York: Teachers College, Columbia University, 1935).

[19]Leslie L. Chism, The Economic Ability of the States to Finance Public Schools (New York: Teachers College, Columbia University, 1936).

[20]John K. Norton and Margaret Alltucker Norton, Wealth, Children, and Education (New York: Teachers College, Columbia University, 1937).

[21]Advisory Commission on Intergovernmental Relations, Measures of State and Local Fiscal Capacity and Tax Effort.

not designed to measure local fiscal capacity, essentially the same approach is used in a new report by the ACIR to measure local fiscal capacity.[22] The ACIR takes the fifteen most commonly used state and local taxes, on a nationwide basis, estimates the base of each of these taxes in the various states, and fixes a rate which when levied upon each of these bases will produce the same total tax revenue in the nation that is now being produced by these taxes in the states in which they are used. Essentially the same methodology is used for determining local fiscal capacity.

No effort is made to determine the rate at which these bases will be willingly tapped by the individuals living in the units, or 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 grossly unrealistic to assume that the base in question could be tapped at identical rates by each state or locality. Therefore, every other base is implicitly assumed to be present in each state or locality in identical relative amounts compared to the base in question. 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 exist at differing levels in different units and therefore lead to different measures of fiscal capacity.

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[22] Advisory Commission on Intergovernmental Relations, Measuring the Fiscal Capacity and Effort of State and Local Areas.

Even though it is not stated in so many words 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

Total Tax Revenues from Base A =

Average Tax Rate on Base A(Total Tax Base A)

or, in algebraic form,

$$Y = bX$$

or

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

As is obvious from examining the equation for obtaining an ACIR-type tax rate the estimating equation 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

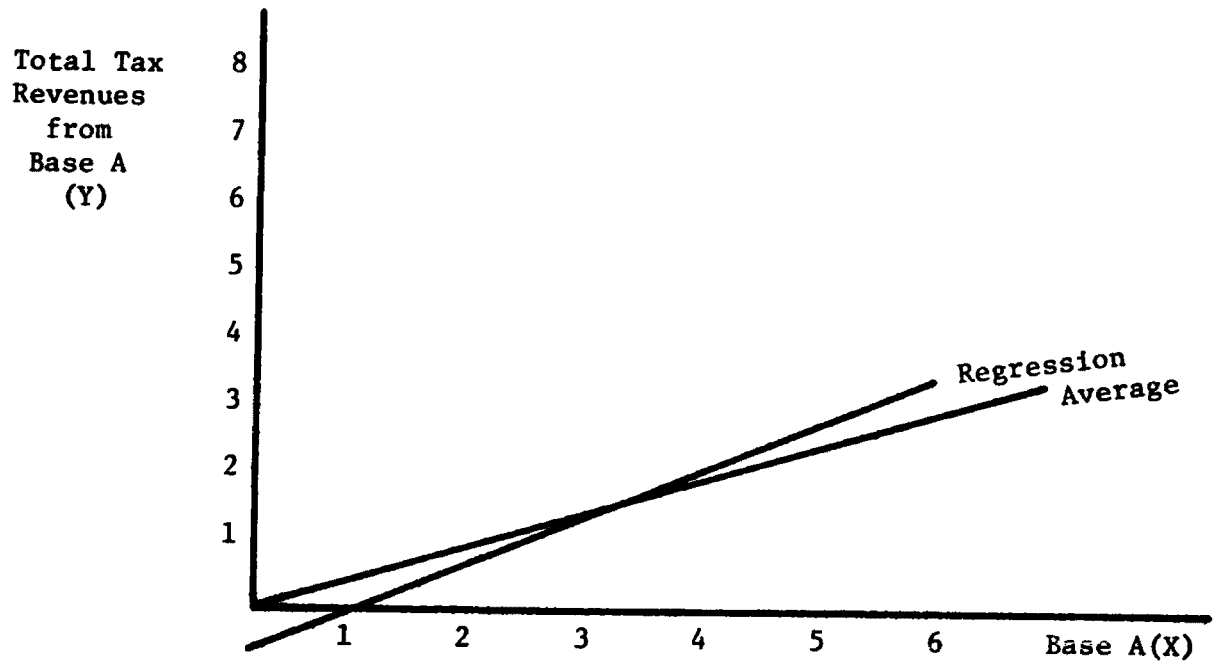
$$\frac{a}{X} + b = \frac{Y}{X}$$

or

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

does allow the fitted regression line not to pass through the origin. In essence the difference between using a simple regression analysis coefficient and a simple weighted average for prediction 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 average estimates, as the term implies, only 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. 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 the

Figure 1



regression line which is not constrained to pass through the origin. The 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 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. It is quite obvious that if an equation that will predict taxing behavior at the margin is desired the use of regression coefficients for weighting is preferable to the use of weighted average tax rates. If simple arithmetic averages provided better estimates of relationships among variables than regression analysis, the effort spent by statisticians in deriving least squares regression coefficients would be foolish. But the fact that in almost all cases we desire estimates of behavior at the margin almost completely rules out the use of ordinary arithmetic averages for estimation purposes.

The above discussion compares the ACIR weighting method to regression analysis under the assumption that simple relationships between single independent variables and the dependent variable 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. It must be reiterated that this is the most serious fault of the ACIR method.

The ACIR method takes a simple arithmetic average of the rate on each base while taking into account no other base. Ordinary least squares

multivariate regression analysis, however, minimizes the sum of the squares of the deviations from the fitted regression estimate and therefore takes into account the action of all variables simultaneously. While the use of simple arithmetic averages for each base independent of other bases is a reasonable first approximation to measuring the effects of various bases, this method is vastly inferior to the use of ordinary least squares multiple regression analysis in estimating the relationships among variables. From reading the ACIR reports, however, one would probably reach the conclusion that no better method than the use of simple arithmetic means was available.

The ACIR approach also fails to take into account the incidence of various types of taxes upon the people within the unit. The only relationship between income and ability to raise tax revenues recognized by the ACIR method is that one which is 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.

Not only the ACIR approach, but also all other representative or model tax plans, suffer from common problems. The choice of bases is highly arbitrary. Using any model or representative tax system there are as many possible measures for fiscal capacity as there are possible different tax structures and rate combinations. While the ACIR's use of the most widely used taxes and weighted average rates is an attempt to solve these problems, both the weighting methodology and the lack of any relevant theoretical basis behind the bases chosen are serious shortcomings.

What we are interested in in attempting to measure fiscal capacity is the relationship between tax bases and tax revenues or, stated

differently, the manner in which tax revenues can be expected to fluctuate with reference to tax bases. In other words, we are assuming that there is a functional relationship between bases and revenues. The use of the arithmetic mean describes only one aspect of the distribution of individual tax rates. Where the individual tax rates fall along this distribution we have no way of knowing. The only information given is that if all the weighted observations in the distribution are summed and divided by the sum of weights a mean results. Neither the dispersion of the observations nor their relationship to observations on other tax rates for the same units is considered. The use of this method assumes that each rate is completely independent, or that there is no relationship whatsoever between the values of the various tax rates. This is in essence saying that the tax rates on property in a district using only the property tax and in another district using eight other local taxes should be weighted equally in determining the norm for property tax rates. Multiple linear regression analysis, on the other hand, takes into account the fact that it is the variation in revenues, not tax rates, 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.

CHAPTER III

NEED FOR A NEW APPROACH

Discussion

It is our contention, upon reviewing the past efforts of various scholars, up to and including the March, 1971 ACIR effort, that the shortcomings of all past attempted measures are numerous enough to suggest that a better measure should be derived. An income measure taken alone is obviously an unsatisfactory measure for fiscal capacity at the local level. Data problems are not so serious as to rule out the use of income as one factor in an index, but the problems of obtaining either median, mean, or income distribution data for local units for any except census years are almost unsolvable and would seem to dictate against the use of income alone as a measure of fiscal capacity. But an income measure has other shortcomings even if data are available. The use of income alone ignores the fact that most local taxes are, in reality, not income based. It also fails to take into account the fact that much fiscal ability in a unit may result from taxes upon non-residents or the shifting of taxes by residents to non-residents. Non-resident workers, land and business owners, shoppers and travelers demand and use local public services, and through direct taxes such as sales, property, and commuter income taxes can be taxed for these services used. On a local level the fact that people may live in one unit, work in another unit, shop in a third unit, and spend vacations traveling through and seasonally residing in still other units is of

extreme importance. No measure of the income of residents of a community can provide a fiscal capacity measure which realistically takes these factors into account.

The use of total property values as a measure of fiscal capacity at the local level, while probably having fewer shortcomings than the use of income alone, is also unsatisfactory. The massive problems of assessment and equalization to full value in local units render all full value figures suspect. But even if we can assume that in states with competent equalization procedures the numbers are close enough to reality to be used,[1] the use of total property value as a measure of fiscal capacity is beset with problems. The most obvious flaw in this measure is that the true source of tax dollars has to be income. Taxes are paid from income in all cases, and it is highly unrealistic to assume that high income always exists where property values are high, or that poor property owners can sell property to pay taxes. While the use of full property value does give some gross measure of ability to tax outsiders this aspect of fiscal ability is not well captured by total full value of all types of property. To the extent that residential property is prevalent in a community the ability to shift tax burdens out of the community (or the tendency of citizen voters to believe them shifted) will be lessened. It is the

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[1] In New York State local assessments on the various types of property are checked every three or four years by a sample assessment by State assessors. From the relation of full value to the local assessed value, as determined by these assessors, an equalization rate for each type of property is determined. For purposes of this study the assumption has been made that this process leads to full value figures which are comparable over the entire state. To use full value figures in an index may be less satisfactory in other states in which a similar equalization procedure is not used. But as is often mentioned the use of assessed values is simply not feasible due to differing local assessment practices and abilities and also to the fact that a local unit could influence its fiscal capacity measure by under- or over-valuation of property.

existence of commercial, industrial, and seasonal property that allows the tax price to residents of public goods to be decreased and fiscal ability correspondingly increased.

From the discussion contained in the two preceding paragraphs it can be inferred that a realistic fiscal capacity measure must take into consideration both income and real wealth of a community. In many cases the choice of variables to use in such an index has been more or less arbitrary. For instance, the ACIR method chooses "widely used" actual tax bases rather than measures designed to reflect income and wealth of a particular community. While the politically oriented might be expected to hold that actually used tax bases are the true bases relevant to measurement of ability to tax, it is probable that economists in general would reason that the underlying wealth and income of the community as well as the price of a dollar's worth of public goods to the voter-residents should determine the true ability of districts to raise tax revenues. Other variables may determine how many public goods are demanded, given the ability to pay for them, but it is income, wealth, and price that, according to economic theory, determine the constraints on ability to purchase (or, in this case, collect taxes from themselves and others for the purchase of public goods). The use of income, wealth, and price as determinants of fiscal ability is simply an attempt to move back one step and estimate the determinants of all tax bases that exist in the community, rather than simply using the "widely used" bases with weights which are somehow estimated.

The second and probably the most important real problem with all composite indexes is that of putting weights upon the bases used. In past studies either highly arbitrary measures, simple arithmetic averages, or

regression coefficients have been used. 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 local revenues in our sample of communities. We also derive a coefficient of multiple determination (R^2) 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 combined action of the other variables. Therefore, we prefer the use of regression coefficients for deriving weights.[2] These coefficients can be interpreted as representing the norms of taxable capacity related to the existence of the given bases. Account is also taken of the fact that bases exist in combination and that the existence of a form of income or wealth may lead to higher fiscal capacity for reasons other than the fact that a direct tax is levied upon it (this is especially true for income).

For the New York State study it can be said that the regression coefficients derived statistically by multivariate ordinary least squares regression analysis represent norms of revenue raised with relation to

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[2] A paper by Roy Bahl, in which he uses regression analysis to estimate the fiscal capacity of underdeveloped nations, has come to our attention during the last stages of preparation of this study. See Roy Bahl, A Regression Approach to Tax Effort and Tax Ratio Analysis (Washington, D.C.: International Monetary Fund, Fiscal Affairs Department, February 2, 1971). Since our methodology was explained in Fiscal Needs and Resources: An Interim Report to the New York State Commission on the Quality, Cost and Financing of Elementary and Secondary Education, dated earlier than Bahl's manuscript, it is obvious that a similar methodology was derived by Bahl and ourselves independently. It is interesting that the search for fiscal capacity measures led us to similar conclusions about the best possible methodology at essentially the same point in time.

each base for our 104 sample districts, and, to the extent that our sample is representative of the State as a whole, norms for the whole State of New York. It can also be said that the use of regression techniques on data representing actual revenue collections of the units analyzed gives weight 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 local units of the State of New York. The use of the method allows fiscal capacity to reflect what can in reality be reasonably expected given the political system and attitudes that exist. It shows the normal amount of revenues that can be expected to be raised by a local unit, given the existence of the various bases used in the index. Fiscal capacity will be defined for purposes of this study, therefore, as the per capita total revenues that would be expected to be raised by all local governments serving a school district area, given the area's median family income, real property value and its distribution among residential, commercial, industrial, seasonal, and other types of property, and state-wide norms of fiscal effort upon these taxable bases, as determined by linear multivariate regression analysis. The actual empirical estimates of fiscal capacity are obtained by weighting the various independent variables--median family income and the per capita amounts of residential, industrial, seasonal, commercial and apartment, and "other" property--by weights obtained by ordinary least squares regression of actual revenue collections of the unit on these variables.[3] In other words, predicted values of actual revenue collections for each district based upon this estimating equation are the fiscal capacity estimates.

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[3]For the exact definitions of all the variables see the glossary in Appendix B.

This estimation method for local fiscal capacity turns largely on the notion that behavior in accordance with average relationships between taxes levied or collected and the property value and income variables provides an appropriate norm. Thus 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 our "predictor" variables in accordance with the average response of all units subject to our 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 cum public services. Our index of fiscal capacity may also be said to provide an aid to deriving indications of relative fiscal effort. High, low, or medium effort may be gauged simply by comparing actual with expected tax receipts.

Summary

The review of past fiscal capacity literature leads to certain conclusions. Neither income nor wealth alone can capture all the aspects of local fiscal capacity. The ability to tax is a function of more things than simple income, or even of income and wealth. Representative or model tax systems which attempt to put some types of rates upon actual tax bases suffer from the fact that the bases and rates are essentially arbitrarily chosen and that little or no account is taken of the fact that each base works together with other bases in a community. Bases do not exist independently, but concurrently with other bases. Further, one of the major

shortcomings of all past studies is the fact that no account is taken of the actual willingness of individuals and communities to tax themselves. It is hard to imagine something called "fiscal capacity" existing separate from the actual decisions of taxpayer-voters to levy taxes upon themselves. A return to economic principles is called for in estimating fiscal capacity. The factors determining the willingness of individuals to pay for government services should be, among others, income, wealth, and the price of these services. At least these factors could be called the "ability" factors or "capacity" factors in demand for public services. A measure of local fiscal capacity should attempt to measure the relative amounts of ability to tax themselves that exist in communities. Other variables may exist in the community which lead to higher or lower demands for public services at any given level of ability. These could be called need or taste factors and should not be included in a fiscal capacity index. All that the index purports to measure is financial ability, not "needs" or tastes for public goods and services.

CHAPTER IV

HYPOTHESES AND EMPIRICAL ANALYSIS

Background

A perfect fiscal capacity measure should quantify the ability of all governments having taxing powers in a given geographic area to raise revenues for provision of government goods and services. The concept of an absolute maximum fiscal capacity is essentially meaningless, since the absolute maximum that could possibly be raised, if the citizens so desired, would be 100 per cent of all income and wealth of residents plus every possible tax dollar collectable from non-residents. At what levels of non-resident taxation the returns would start to diminish is an interesting question, but not the question that we desire to answer when we speak of fiscal capacity. Measuring an absolute maximum fiscal capacity for units which are open (in the sense of residents being able to move in and out of the area at will), and in which residents did not desire 100 per cent government provision of services, would be even more difficult. One would also have to worry about diminishing returns to taxation due to higher voter-approved tax levels because various residents would choose to leave the community at differing levels of taxation and government services. An absolute maximum ability to raise revenue for government services would have to take into account taxable resources of non-residents, taxable resources of residents, and the demands of both non-residents and residents for public services.

A more useful measure of fiscal capacity will be a measure of the taxable capacity of the area when demand for public services per capita is held to be equal in communities at some average or constant level. The goal in deriving this measure is to identify those elements of a community which lead to ability to raise revenues, irrespective of actual demands for services. Actual demands for services may cause two different units with equal fiscal capacities to raise very different levels of government revenues. But this is due to different demands or "needs" for services, somehow defined, and not to different fiscal capacity. What is really needed is a measure which can quantify the taxing ability of a community possessing given financial resources, and this measure should be based upon reality in the sense that the existence of these resources actually leads to taxing ability. If some hypothetical basis of added fiscal ability does not in reality lead to more government revenues in communities where it exists, it would seem difficult to support the notion of its being a factor leading to greater fiscal capacity.

Empirical Method

Because a measure is needed which can gauge the effects of various factors upon the revenue raising capacity of communities, multivariate regression analysis is the natural choice for the method of estimating fiscal capacity. Multivariate regression analysis by the method of least squares can derive a functional relationship between the dependent variable (actual revenues raised) and the combination of various levels of the several independent variables, which minimizes the squared deviation of actual observed values from the estimated values obtained from this functional relationship. For this reason the empirical method used in

this study will be estimation, by the use of ordinary least squares multivariate regression analysis, of actual tax revenues raised by all local governments in a geographic area.[1]

Units Included

Actual revenues collected by the governmental units encompassed by a school district area have been defined to include tax revenues, license fees, and franchise fees of all local governmental units, including special districts which provide such services as garbage removal and fire protection. It is felt that license and franchise fees are simply taxes by other names and may be charged in some areas for services that are provided from ordinary tax revenues in other areas. The inclusion of all local units has been discussed in Appendix A and is of utmost importance for the appropriate measurement of fiscal capacity.

Revenues Included

The capacity to raise governmental revenues has to include all governmental revenues raised. Because fire protection is provided by the county in one area, by the city in another, and by a special fire district in yet another does not change the fact that the revenue raised for fire protection represents a taxing of the fiscal capacity that exists in the area due to income, property, and other wealth that exist. The money raised for all public services in an area is a result of utilization of the total fiscal capacity. The fact that one school district, for example, contains a city, part of a county, and the school district, while another

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[1] See Appendix A for a discussion of local governments in New York State and the selection of the sample used in this study.

school district area has governmental services provided to residents by a city, part of a county, ten special districts, three towns, and the school district, does not change this fact. If total revenue raising ability of the various governments from the citizens in question is the same in the two school districts then fiscal capacity is equal, even though sixteen governments share the taxes in one area and only three share them in the other. Though actual fiscal capacity also includes revenues that can be raised by the state and federal governments, it is assumed that, because this study deals with school district areas located within the same state, the relevant state and national tax system is identical for all of the sample units, and for purposes of analysis can be ignored. This is, of course, an oversimplification of the complex relationships of state and federal governments to local units, but we believe it to be a justified oversimplification since an analysis including these sectors would be forced to attempt to measure the revenues collected by the state and nation in each school district area and to include revenues from state and federal aid in local revenues. The concept of local ability would become so entangled with state and federal level ability that disentanglement would become in some sense impossible. We therefore assume that the state and federal governments exist, that they tax individuals and firms located in local communities, and that the taxes collected by these higher levels can simply be considered as removed from local resources before the local revenue raising process begins. Under this frame of reference resources which go to state and federal governments do not exist for the local units insofar as fiscal capacity is concerned. Local fiscal capacity by definition becomes a concept concerned only with the residual remaining after state and federal taxation.

Choice of Local Unit

Because of the necessity of using local units which include all the governments servicing a given group of people, it is necessary for analysis that one unit of government be chosen, and that all other units which are included, in whole or in part, within the area covered by the chosen unit be included as part of the unit for purposes of such things as determining total revenue collections. Since this study has as its primary purpose examination of the "needs" of school districts and the ability of these districts to finance these "needs" independently, the decision-making unit for school taxation and expenditure is the desired unit of analysis. But because, in New York State, school districts are not in most cases coterminous with other local units of government, choosing a sample of school districts to analyze is an extremely difficult problem. Districts for this study are chosen by overlaying school district maps upon other local governmental unit maps, and choosing only districts which can be approximated by the summation of various other local governmental units. It is necessary in some cases to allocate some fraction of the revenues, property values, expenditures, etc. of local units only partially included in school districts.[2] It is also necessary in many cases to take a weighted population average of median family income in order to get one median family income figure for each school district.

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[2]See Appendix A for a much more detailed discussion of the sample choice and problems.

Data

Once the sample is selected, data, based upon the desired formulations and constrained by actual data availability, must be collected. For the income variable, median family income is chosen, not only because it is less amenable to drastic change by extremely high or low values than is mean income, but also because this is the income variable available in Census data for all types of governmental units in New York State. Because only Census data are available for all the relevant units, 1959 median family income has to be used as a proxy for 1967-68 median family income.

The desired property values are easier to obtain than the income data. Official New York State records of property values in each municipality are available on electromagnetic tape for computer analysis. Full value of 26 types of taxable property is included. The main property data problems are that village data are not available on the same tape,[3] and that the 26 property types must be consolidated into a more manageable number of general types for statistical analysis.

Our final decision regarding the choice of categories of property types is as follows:

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[3]Village data are available on printouts. Full value is available for the types of property which have been sampled by State assessors. In the districts used for which village data are needed, sampling has been done of the types of property making up at least 80 per cent of full value. Other minor property types are given only assessed valuations. We estimate full values for these types of property by subtracting full value of sampled types from total value for the village, obtained from State of New York, Department of Audit and Control, Division of Municipal Affairs, Special Report on Municipal Affairs by the State Comptroller, Transmitted to the Legislature March 18, 1969 (Albany: March 18, 1969), and proportionately raising the assessed values of non-sampled properties until their total equals the full value residual.

1) Commercial (PCOM)[4] = Commercial property, apartments, combinations, and other commercial property;
2) Industrial (PINDUST) = Vacant lots in urban industrial or commercial areas, industrial property, utilities, railroad non-ceiling property, and oil wells;
3) Residential (PRESID) = Abandoned farms, vacant land in residential areas, single-family residence, multiple-family residences (2 or 3), operating farms, muck farms, and estates;
4) Seasonal (PSEASON) = Seasonal residences and resorts;
5) Other (POTHER) = Rural vacant land, privately-owned forest lands, and special franchises.

The most difficult choices of classes are related to the classifications of apartments and combinations, operating and muck farms, and special franchises. The assumption is made that apartment dwellers will not behave as if local property taxes are included in rental payments. Early tentative regression analysis showed that this assumption appears to be realistic and that the coefficient on apartments and combinations is more similar to that on commercial property than to the coefficient on any other general class. For this reason apartments and combinations are placed in the commercial category. The decision is made to place farms in the residential category, because in the nearly perfect agricultural market (numerous sellers each lacking the ability to affect prices) it should be impossible for taxes to be shifted onto prices. The full burden of property taxes should fall upon owners of farm property, and their voting behavior with respect to property taxes should be similar to that

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[4]See exact definitions of property type categories in the glossary, Appendix B.

of owners of equal values of residential property. Special franchises, rural vacant land, and privately owned forest land are lumped into a catch-all category "Other" because they seem to fit nowhere else. The value of special franchise property (transmission lines, poles, pipes, and other utility capital located on public property) in a district is loosely connected with the industrial aspect of public utilities since it mainly reflects the value of the distribution setup that exists. There can be much special franchise value in a district having no actual utility plant. Special franchises is, therefore, included in the "Other" class for the simple reason that it is dissimilar to the property types included in the four "non-Other" classes.

Hypotheses to be Tested

Local fiscal capacity varies directly with the median family income

The actual regression analysis is designed to test several essential hypotheses. The first important hypothesis is that community income level is an important determinant of local fiscal capacity. The reasoning behind this hypothesis is that, based upon simple principles of economics, the demand for goods and services can be said to be a function of income, wealth, prices, and tastes or preferences. The factors that determine the capacity of communities to pay for goods and services, however, are income, wealth, and the proportion of the governmental revenues that has to be raised locally. Median family income (MFI) is used as the necessary income variable for several reasons. The family is the most realistic unit to represent the demander of public services. It is family units or households that receive garbage pick-up, fire protection, and much of police protection; that often travel together on the highways; and that

demand education for their children. Median rather than mean family income is used because of the smaller susceptibility of this measure to large fluctuations due to small numbers of extremely high or low income families. This characteristic of lack of sensitivity to extreme is especially important for an income variable that represents income levels of a small local unit. The smaller the unit the more susceptible the mean will be to extreme observations. Of course, the median in a sense ignores extreme observations, assuming a more or less symmetrical distribution of incomes around the median in all communities. Even though a median measure does have this shortcoming, however, we contend that, with estimation of total taxes collectable from all residents as the goal, knowledge of the income of the middle family in the income distribution is more informative than information about the average income. The median does tell us with certainty what income level is exceeded (and in turn fallen short of) by approximately 50 per cent of the residents. This information gives us some idea of the distribution of income in the community, while mean gives us almost no information that is useful in recreating the income distribution of the unit.[5]

Even though median family income is preferred to a mean income measure for the purpose of constructing a local fiscal capacity index,

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[5]To test whether distribution of income or median income more effectively explain fiscal capacity an alternative analysis was run replacing MFI with the two independent variables, percentage of families with incomes less than $4,000 (YL4) and percentage of families with incomes of $10,000 or more (Y10). $4,000 was chosen because it is the Census breakdown nearest the HEW-defined poverty level, while $10,000 and above was chosen as the wealthiest bracket simply because it is the highest bracket available in the Census data for all types of jurisdictions. The use of YL4 and Y10 as variables should effectively represent the income distribution of the community by implicitly assigning all families to one of three classes, under $4,000, $4,000 to $9,999, and $10,000 and above. The results of this regression analysis were as follows:

there are problems involved in obtaining median income figures for units smaller than counties. The only available data for units of this size are U.S. Census data, which are available only once each decade. It is our contention, however, that the use of median family income data from the most recent Census, which can be up to 10 years old, while obviously not the optimum solution if newer data were available, is acceptable and does not cause serious bias in the results. For the regression results to be exactly the same as they would be if up-to-date data were used the units being analyzed must all experience increases in median family income at the same average percentage rate over the period between the collection of the Census data and the period of analysis. Under these conditions

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PLREV = 8.28 - .028 YL4 + .465 Y10 - .0019 PRESID + .041 PCOM
"t" values = (2.618)(-.339) (4.087) (-.304) (6.480)

+ .025 PINDUST + .018 PSEASON + .156 POTHER R^2 = .8289
(5.444) (3.299) (5.964)

The R^2 was reduced slightly by the introduction of the two distribution variables to replace MFI. It is obvious that (YL4) has such a low "t" value that with no confidence can the coefficient be considered different from zero. It seems that in this equation (Y10) serves as a proxy for MFI, with (YL4) having almost no effect upon the results. This form of the equation also results in a negative coefficient for PRESID; but because of the size of the "t" statistic, this negative sign cannot be taken very seriously (for the same reason the statistical analysis gives no concrete support for PRESID as a significant variable in the MFI form of the equation). Because this (YL4), (Y10) form of the estimation equation predicts actual local revenues slightly less well than the MFI form, and because of the nonsignificant coefficient on (YL4) and the negative sign on PRESID, this equation was rejected as inferior to the MFI form.

Suggestions were also made that we use as the income variable median family income minus some subsistence income amount. This procedure of subtraction would not change the variable at all insofar as ordinary least squares regression analysis is concerned. This linear transformation of the variable would in effect only change the scale. Ordinary least squares is not sensitive to changes of the scale of variables; if it were, results could be manipulated by simple scaling operations. Anyone who desires may use our results with the assumption that a minimum subsistence level of income has been removed before fiscal capacity is estimated.

multiplying each median family income figure by an identical constant would yield exactly orrect current figures. Because the multiplication of an observation vector by a constant will not change the regression results, to the extent that the average percentage rate of growth is equal among districts, the regression results using non-current median family income figures will be identical to those obtained using current figures. Because it was obviously impossible to determine at what rate median family income had increased in our sample districts from 1959 to 1967, the validity of the assumption of approximately equal average growth rates of median family income was tested by an examination of 28 New York State cities and villages for which income data were available for the ten-year period 1949 and 1959. Table 1 contains a listing of the cities examined and the relevant income data.

For this small sample of 28 units (used because the use of larger geographic units such as counties, for which similar data are available, might allow migrations of high or low income residents from cities to suburbs to cancel out over units containing both cities and suburbs), each of which can be classified as independent cities, suburbs, and "Big Five" cities, the data seem to support our contention that the use of "old" income data does not result in serious problems. The simple correlation coefficient (r) between 1949 median family income and 1959 median family income is .88 (R^2 = .77). The maximum district difference between actual 1959 median family income and a regression estimate of 1959 MFI, based on 1949 MFI, is -$927. Multiplying the coefficient on MFI for the fiscal capacity estimating equation (.0268)[6] times -$927 gives a maximum underestimate of fiscal capacity (FC) for this 28-unit sample of $24.84.

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[6]See page 51, estimating equation (3).

TABLE 1

MEDIAN FAMILY INCOME FOR A SAMPLE OF 28 NEW YORK CITIES

City or village	1949 median family income (MFI)	Rank	1959 median family income (MFI)	Rank	Change in rank, 1949-59
Albany	3,431	17	5,778	20	3
Amsterdam	3,684	9	5,501	25	16
Auburn	3,350	20	5,518	23	3
Binghamton	3,606	10	6,251	11	1
Buffalo	3,401	18	5,713	21	3
Elmira	3,320	23	5,452	27	4
Hempstead village	4,248	3	7,455	5	2
Ithaca	3,252	26	6,125	13	13
Jamestown	3,463	15	5,607	22	7
Kingston	3,212	28	5,875	18	10
Lackawanna	3,452	16	6,058	15	1
Lockport	3,353	19	6,584	8	11
Mount Vernon	4,095	6	6,873	6	0
Newburgh	3,324	21	5,363	28	7
New Rochelle	4,215	5	8,131	1	4
New York City	3,526	13	6,091	14	1
Niagara Falls	3,716	7	6,630	7	0
Poughkeepsie	3,595	11	5,893	17	6
Rochester	3,561	12	6,361	9	3
Rome	3,324	21	6,255	10	11
Schenectady	3,713	8	5,925	16	8
Syracuse	3,471	14	6,247	12	2
Troy	3,257	25	5,502	24	1
Utica	3,268	24	5,873	19	5
Valley Stream village	4,267	2	8,021	2	0
Watertown	3,251	27	5,480	26	1
White Plains	4,326	1	8,012	3	2
Yonkers	4,219	4	7,471	4	0

Source: U.S. Department of Commerce, Bureau of the Budget, City-County Data Book, 1962 (Washington, D.C.: U.S. Government Printing Office, 1963).

While the use of a measure which accounts for .77 of the variance of the preferred measure is not optimum, we do believe that its use is justified in the absence of a better measure of current median family income.[7] It is obviously true that the collection of income data yearly, or even every five years, would provide income data in which we could have more confidence. But we also must consider that the methodology used suffers to the maximum only in the last year before a new Census, and that in early years of a new decade the Census figures are probably much nearer to the actual values.

The facts that residential property value per capita and median family income tend to be highly correlated (simple correlation coefficient of .71) and that residential property value per capita is one of the independent variables included in the estimating equation also tends to alleviate the problem of "old" income data to some extent. That the two are highly correlated, and that it is impossible by statistical methods to determine how much of the total variance explained by the two variables is attributable to each, are the main reasons that both median family income and per capita residential property value are retained as independent variables even though the "t" statistic for residential property

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[7] An attempt was made to use the income estimates for school districts which were recently published by the National Educational Finance Project (see Dewey H. Stollar and Gerald Boardman, Personal Income by School Districts in the United States (Gainesville, Fla.: National Educational Finance Project, 1971)). We found very obvious and gross errors in this data and were unable to use it. We found per capita adjusted gross income estimates derived from these data obviously incorrect for seven of our 104 sample districts. For example, when AGI per pupil was multiplied by the number of pupils to obtain total AGI per district and this number was divided to get AGI per capita, the number resulting for Albany school district was $509 and for Minisink school district it was $218. If the people in these districts are surviving on incomes of this level, much of the food, clothing, and shelter that they are consuming must be coming from self-production and be excluded from income. AGI per capita of $218 is clearly impossible.

value per capita is not high. Though the proportion of variance in fiscal capacity explained by income and the proportion explained by residential property per capita cannot be separated with a high degree of confidence, the total effect of the two combined is well explained by the two variables in combination. For our purposes the allocation of fiscal capacity between the two variables is not of utmost importance, so long as the estimate of their combined effect can be accepted with confidence.[8]

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[8]When an estimating equation using only the five property types (including PRESID), without median family income, was used, the results were as follows:

PLREV = 73.06 + .023 PRESID + .055 PCOM + .025 PINDUST +
"t" values = (4.69) (5.62) (8.74) (4.93)

.014 PSEASON + .140 POTHER R^2 = .7827
(2.33) (4.87)

When the variable MFI was substituted for PRESID the results were:

PLREV = -32.21 + .028 MFI + .041 PCOM + .025 PINDUST +
"t" values = (-1.48) (8.57) (6.97) (5.67)

.016 PSEASON + .176 POTHER R^2 = .8357
(3.01) (6.92)

When both MFI and PRESID were included the results were:

PLREV = -29.22 + .0268 MFI + .0025 PRESID + .042 PCOM +
"t" values = (-1.29) (5.62) (0.49) (6.96)

.025 PINDUST + .016 PSEASON + .175 POTHER R^2 = .8361
(5.67) (2.94) (6.75)

The inclusion of both variables added almost nothing to the R^2, compared to inclusion of MFI alone, but the use of both variables is preferable because of the high intercorrelation between the two variables and the fact that what is being explained by either alone includes part of the effect of the other variable. It is also best to leave PRESID in the equation because otherwise total property value in the unit will not be ascertainable from the information which the data provide. When substituted for PRESID, MFI seems to pick up essentially all the explanatory power of PRESID plus some explanatory power not evident in PRESID. When PRESID is added back to the equation without removing MFI the coefficient on PRESID is small and the t statistic indicates that the coefficient on PRESID is not significantly different from zero. MFI is the better choice

Local fiscal capacity varies directly with real property wealth levels

The second hypothesis to be tested is that wealth, and because of local taxing practice especially wealth in the form of real property, is an important element of fiscal capacity.

Not only is spending behavior determined by the amount of income earned in a given year[9]--the flow of income--but also by the value of past

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if only one of the two variables is to be included. But due to the facts that PRESID picks up much of MFI's power of explanation in its absence, that the two have a simple regression coefficient of .71, that on theoretical grounds, we could assume both variables to be important in explaining fiscal capacity, and that information on total property value would be missing without this variable, the decision to leave PRESID in the equation was made. Because of the small coefficient on PRESID, however, it is MFI that explains most of the variation in fiscal capacity for given levels of the other property types per capita.

[9]The hypothesis that fiscal capacity is possibly related to median family income in a non-linear manner was also tested. The simple correlations of PLREV and various powers of MFI were calculated and the results were as follows:

Power of MFI	Simple correlation coefficient with PLREV
.9	.4478
1.0	.4481
1.05	.4481
1.1	.4479
1.2	.4472
1.3	.4460
1.4	.4443
1.5	.4422
1.6	.4396
1.7	.4366
1.8	.4322
1.9	.4296
2.0	.4256
3.0	.3780

These results give strong evidence that the relationship between PLREV and MFI is almost exactly linear. The same powers of MFI were substituted into the multivariate estimating equation in order to test for interrelationships which might give evidence that in conjunction with the other variables some power of MFI gave better predictive results. For the equation PLREV = c + a (power of MFI) + b (PRESID) + d (PCOM) + e (PINDUST) + f (PSEASON) + g (POTHER), the highest R^2 obtained was .8361 when simple

income stored in the form of property and savings--the stock of income built up over time. In much the same way that income gives an indication of ability to purchase goods and services, property owned by individuals serves as an indicator of ability to pay. Although property is probably rarely sold in order to pay taxes, the more real wealth that exists in an area in the form of various types of private property and past savings embedded in various other forms of assets, the more ability the area will exhibit to raise money for purposes of purchase of public goods and services. While neither income nor wealth alone gives a full picture of the ability to purchase goods and services, the two combined give much more information about the fiscal capacity of an area.

The use of real wealth, or property values, as a proxy for total wealth is again a non-optimum procedure in our view. But the data necessary for using net worth or total wealth simply are not available for local areas. Because local taxing systems are to a great extent property tax dominated, property value data do tend to exist for local areas. To the extent that real property values are correlated with total wealth, and we assume that the correlation is high, the use of this variable is justified. In estimating fiscal capacity of local areas in New York, it is even more strongly justified by the practices of local governments. In general real property is the only form of wealth that is taxed locally in New York, and taxes on this form of wealth are the predominant local

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MFI was used (the R^2 with $MFI^{1.05}$ was .8252, which is of interest since the four-place simple correlation coefficients were the same for MFI and $MFI^{1.05}$). The highest "t" statistic on a power of MFI was also obtained for simple MFI and was 5.62. This evidence strongly denies the idea of a non-linear relationship between fiscal capacity and median family income.

tax.[10] To test the hypothesis that wealth is an important determinant of fiscal capacity, real property wealth will be used, because the data are available and in New York this is the form of wealth most often taxed locally. Since the property tax pays for a high percentage of local government purchases, it appears obvious that property values are an important determinant of local fiscal capacity.

Different functional types of real property vary in their ability to produce local fiscal capacity

A third hypothesis to be tested is that various classes of real property value have different quantitative effects on fiscal capacity. This is true because of two intertwined facts of reality in local taxation. These facts are that not only residents but also non-residents can and should be taxed locally; and, that whenever local residents, either correctly or incorrectly, perceive non-residents as bearing part of the local property tax burden, their perceived "price" of public goods and services will fall. For given levels of local income and real property values, the ability to shift local taxes onto non-residents obviously adds to the capacity of a locality to raise tax revenues. But not only can more taxes be raised locally in a unit with given local resources when taxes are shifted outside the locality, but also more taxes can be willingly raised in a locality so long as the residents perceive the burden of taxation as falling outside the community. For example, it should be easier to obtain the votes needed to pass a referendum to raise $1 million through local taxation the larger is the percentage of this revenue the local voters perceive as being shifted outside the community.

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[10] In 1968-69, 85.4 per cent of total local tax revenues were derived through property taxes. U.S. Department of Commerce, Bureau of the Census, Government Finances in 1968-69 (Washington, D.C.: U.S. Government Printing Office, 1970.

An example of the "price" effect may be informative.[11] If nationally-owned industrial corporations located in a locality sell virtually all of their products outside the community, and if all property taxes on industrial property are shifted to the price of the goods sold, non-residents bear essentially all of the initial impact of the property tax upon these industrial firms. To the extent that such firms make up the property tax base of the community this shifting will result in a lower "price" to residents of the community for a given dollar value of revenue raised for expenditure on public goods and services. For example, if half the property tax base is industrial and all industrial property taxes are shifted out of the community, in the form of higher prices on their output, the local residents have to raise only half the tax revenues for any local property tax financed expenditures. The tax price to residents is therefore only half of the tax price to residents of a similar community with equal total real property, all of which is residential. Non-residential types of property will be important in lowering the tax price to residents not only because of the shifting of the property tax, but also because of the shifting of local non-property taxes, and of the fact that their existence leads to abilities to levy taxes directly upon non-residents. For instance, the presence of commercial firms allows sales taxes to be levied on non-residents; and non-resident workers in commercial establishments make possible the use of the non-resident income tax for collecting local tax revenues. The existence of resort property

[11] It should be emphasized that what is here called the "price" effect of non-residential property is, in economics jargon, a combined price and income effect. The existence of the non-residential property not only lowers the price of tax revenues to resident-voters, but also shifts the community's resource constraint outward. Not only are prices lower to residents, but the total resources subject to taxation by the unit are also increased. The voters have a lever through which to tap additional sources of income besides those of residents of the community.

allows for shifting of local taxes and for the direct levy upon non-residents of such taxes as sales and occupancy.

Because non-residents do use services of a community--take as an example a community with few permanent residents but many seasonal residents and tourists--the benefit principle of taxation leads to the conclusion that they should be taxed for the services enjoyed. Variables indicating the amounts of non-residential property by type in a district allow us through regression analysis to obtain estimates of the ability of the locality to tax non-residents. Obviously seasonal resort property represents a more likely source of revenue from non-residents than does residential property.

Because of the belief that the "price" effect will be of different quantitative importance for different types of non-residential property, this study divides non-residential property per capita into four classes, each of which would appear, a priori, to be different with respect to the represented ability to tax outsiders, and therefore with respect to the resulting tax price of a given bundle of public goods for voter-residents. The non-residential property classes are industrial, commercial, seasonal, and other.[12] The assumption is that the coefficients on these non-residential property variables will represent, by their magnitudes, the importance of each type of property to fiscal capacity, and the hypothesis is that each of these coefficients will be larger than the one for residential property. An implicit assumption of this analysis is that the total impact of taxes on residential property is borne locally.

The assumption is that a relatively large coefficient on one of these property types is an indication that this type of property gives

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[12]See the glossary (Appendix B) for a listing of the types of property contained in each class.

rise to a relatively low local tax price of revenue raised by property taxation.[13] Essentially identical coefficients would be indicative that the different types of property do not lead to differing degrees of actual or perceived ability to shift taxes out of the locality, and, therefore, that the price of revenue raised by taxation does not differ due to the types of property located in the unit.

Empirical Tests of Hypotheses

The first simple empirical test of the above hypothesis is made by running a simple correlation analysis over all the independent variables and the dependent variable, actual local government revenues raised (PLREV). The results are as follows:

Matrix of Simple Correlation Coefficients

	PLREV	MFI	PRESID	PCOM	PINDUST	PSEASON	POTHER	PTPROP
PLREV								
MFI	.4447							
PRESID	.4661	.7149						
PCOM	.6110	.4613	.3253					
PINDUST	.2332	-.0387	-.0793	.0543				
PSEASON	.4784	-.1854	.0846	-.0290	-.0218			
POTHER	.6152	-.1661	.1018	.1503	.0032	.7757		
PTPROP	.8356	.3859	.6328	.5207	.3498	.6133	.6029	

The main item of interest at this early stage of analysis is that median family income (MFI) and per capita full value of property (PTPROP), each taken alone, is able to "explain" an appreciable proportion of the variance in total local revenue raised (PLREV). This tentatively confirms that median family income and per capita taxable value of real property

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[13] The magnitude of the coefficients can be interpreted as representative of the relative revenue capacity of the different property types because each property type is similarly scaled. The coefficients represent marginal dollars of expected revenue raised per added dollar of property value of a given type.

are important determinants of fiscal capacity. The simple correlation coefficients indicate that MFI alone can explain 20 per cent of the variance in PLREV and that PTPROP alone can explain 70 per cent.

This correlation matrix is also interesting in that it allows us to check for high levels of correlation among the independent variables. The high correlation of PRESID and MFI is expected and has been discussed previously.[14] The only other disturbingly high simple correlation coefficient is that between PSEASON and POTHER. High correlation between the two independent variables (multicollinearity) may result in more or less arbitrary distribution between them of their joint effect, as reflected by their respective coefficients. In other words, statistical analysis may indicate that one of the variables in question has a more significant relationship and the other a less significant relationship to the dependent variable than is in fact the case. It may then be decided, on the basis of some test of significance such as the student "t," that the coefficient on the less significant variable is not significantly different from zero. This in reality significant variable may as a result be deleted from the estimating equation. But, in the actual equations that include both PSEASON and POTHER, the "t" values on each are high and obviously indicative of coefficients whose values are different from zero. For this reason the multicollinearity is considered to be of minor importance and is ignored. Even though the relative quantitative impact of the two variables may be questionable, their combined effect is believed to be captured accurately by their coefficients.

The second level of testing of the hypotheses consists of moving from simple correlations to multivariate regression analysis. This step

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[14] See pages 41-42, especially footnote 8.

is necessary because simple correlation between pairs of variables does not necessarily give evidence that the variables are significantly related when interactions with other variables are taken into consideration. All variables that the hypotheses suggest have major impact on a dependent variable must be regressed in combination upon the dependent variable in order to test for true significance.

Regressing PLREV upon PTPROP and MFI to test the hypotheses that both median family income and property values are important determinants of fiscal capacity gives the following results:

1) PLREV = 20.88 + .0099 MFI + .03157 PTPROP R^2 = .7158
"t" values = (.85) (2.50) (13.57)

It can be seen that the "t" statistic indicates significance at better than the .01 level for PTPROP and better than the .02 level for MFI. These two variables combined explain 72 per cent of the variance in actual local revenues raised. This evidence seems to confirm strongly the first two hypotheses, that MFI and PTPROP are significant factors in explaining the fiscal capacity of school district units.

In order to test for the hypothesis that a price effect exists and can be accounted for by a fiscal capacity measure that divides property by types the following relationship was estimated:

2) PLREV = 73.06 + .0229 PRESID + .0548 PCOM +
"t" values = (4.69) (5.62) (8.74)

.0247 PINDUST + .0144 PSEASON + .1403 POTHER R^2 = .7827
(4.93) (2.33) (4.87)

It can be seen that not only is each variable significant at at least the .02 level, but that the explanatory power of types of property subdivided in this manner, with no income variable, is greater than that of total

property combined with median family income.[15] The coefficients on different types of properties do differ in this multiple-variable equation and would seem to suggest that, when each base is present in its average amount, at the margin the order of importance to fiscal capacity of property types moves from highest to lowest in the following fashion:

POTHER

PCOM

PINDUST

PRESID

PSEASON

The fact that at the point of averages a marginal dollar's worth of residential property appears to add more to fiscal capacity than a dollar's worth of seasonal property can perhaps be explained by the fact that PRESID and MFI are highly correlated and that much of the variance being explained by PRESID is in truth due to the fact that in areas where PRESID is higher, income and thus taxpaying capacity tend to be higher. To test this hypothesis, as well as to test the implication of the original hypotheses--that MFI plus property divided by types can most effectively explain fiscal capacity--the following equation is estimated:

3) PLREV = -29.22 + .0268 MFI + .0025 PRESID + .0415 PCOM +
"t" values = (-1.29) (5.62) (0.49) (6.96)

.0249 PINDUST + .0159 PSEASON + .1745 POTHER R^2 = .8361
(5.67) (2.94) (6.75)

In this equation PRESID becomes non-significant, by the criterion of the "t" test, while all other property type variables continue to be highly significant (all significant at better than the .01 level). Because of

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[15] Total property as a single independent variable explaining PLREV gives an R^2 of only .6983.

the intercorrelation between MFI and PRESID we can only suggest an explanation for this result. It appears from this final equation that, once the price effect of non-residential property has been taken into account, the main reason that residential property per capita explains much of the remaining variance in local governmental revenue collections is that it is a proxy for income. Once income is considered, and the positive spending effort of income accounted for, the existence of more residential property leads to little additional ability and/or willingness to pay for governmental services. That a unit in which much residential property exists might have high property taxes may in fact indicate that it is the income, which is correlated with this property, that causes voters to be both able and willing to levy property taxes, not the existence of the property itself. But the opposite seems to be true for other types of real property. Even after income level is accounted for, the existence of non-residential property leads to significantly higher levels of fiscal capacity. It would seem that the "price" effect due to the shifting of taxes to outsiders (or the belief of residents that taxes are so shifted) can explain the greater ability of certain areas, having large amounts of the types of property which allow this "price" effect to come into play, to collect greater amounts of local revenues.

Equation (3), based upon the hypotheses originally stated, explains 84 per cent of the variance of local revenues actually raised by "school districts." The coefficients are, according to the "t" test criterion, significantly different from zero, except in the already discussed case of per capita residential property (see footnote 8, page 42). Other alternative equations were examined and found less satisfactory in terms of percentage of variance explained. The fitted values of this equation

for each of the 104 school district areas in our sample will therefore be the measures used as fiscal capacity estimates for these districts. At any future point in this thesis the term fiscal capacity (FC) will denote the index of ability to raise local tax revenues determined by the use of this estimating equation.

Testing the Independence of "Capacity" and "Need" Type Explanatory Variables

A problem could result if the property value types and/or median family income--the "capacity" variables used for estimating fiscal capacity--were highly correlated with "need" or "demand" type variables. The methodology of estimating fiscal capacity by the use of "capacity" variables only is legitimate only insofar as the omission of other variables from the estimating equation does not allow parts of the variance that should be explained by other variables to be explained by "capacity" variables.[16] This could happen if our "capacity" variables were highly correlated with "need" variables. If the variables we have chosen to estimate capacity are highly correlated with other variables which reflect demand for public goods and services, the fiscal capacity estimating equation may in fact be estimating <u>both</u> demand for public services and capacity to finance them locally. It is, therefore, of utmost importance that the correlation between the FC estimation variables and variables reflecting tastes or "needs" for public goods be small.

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[16] In Chapter VI the fiscal capacity measure obtained here is combined with "need" variables in a two-stage process to explain actual expenditures. If fiscal capacity has already explained part of the variance that should be explained by "need" variables the resulting coefficients and "t" values on the "need" variables will be different from those that would be obtained if all "capacity" and "need" variables were combined into one equation and regressed upon PLREV.

As a test of the interrelations among our "capacity" and "need" or "demand" variables a correlation matrix containing the "capacity" variables--median family income (MFI), per capita residential property (PRESID), per capita commercial property (PCOM), per capita industrial property (PINDUST), per capita seasonal property (PSEASON), per capita miscellaneous property (POTHER), and fiscal capacity (FC)--and 11 possible "need" variables--population density (DENSITY), population density squared (DENSQ), area (AREA), percentage of low achievement test scores in public schools (ACHU), public school enrollment as a percentage of the total population (ENPOP), predicted crime rate (CRIME), percentage of population non-white (NONWH), percentage of population over 65 years of age (AGED), percentage of population 5-15 years of age (CHILD), children receiving aid to dependent children as a percentage of the total population (ADCPOP), and population of the unit (SIZE)[17]--was generated. The results of this generation were as follows:

Simple Correlation Coefficients

	DENSITY	DENSQ	AREA	ACHU	ENPOP	CRIME	NONWH	AGED	CHILD	ADCPOP	SIZE
MFI	.37	.21	-.32	-.20	-.13	.48	.10	-.17	-.18	-.26	.07
PRESID	.21	.10	-.32	-.33	-.08	.19	.05	.06	-.13	-.37	-.06
PCOM	.32	.26	-.06	-.16	-.28	.27	.25	-.04	-.26	-.10	.09
PINDUST	.10	-.02	.04	-.05	-.09	.04	.08	-.21	-.00	.10	.01
PSEASON	-.25	-.15	.37	-.17	.02	-.27	-.11	.36	-.07	-.17	-.15
POTHER	-.18	-.09	.57	-.17	.03	-.23	-.04	.26	.02	-.16	-.11
FC	.14	.11	.22	-.30	-.17	.14	.11	.07	-.18	-.26	-.02

[17]For definitions of variables see glossary. A much more detailed discussion of the idea of "need" and of the rationales behind the choices of "need" variables can be found in the larger report from which this

The highest correlations are between POTHER and AREA (because forests are a major element of POTHER and normally occur in large units) of .57 and between MFI and CRIME (perhaps because urban areas tend to have higher crime rates than non-urban areas and median family income and degree of urbanization tend to be highly correlated) of .48. This indicates that the R^2 between our two most highly correlated variables would be .32. That one of our "capacity" variables can explain 32 per cent of the variance of one of the 11 "need" variables does not on the surface indicate correlation among independent variables of a level that would cause problems. Once fiscal capacity is derived it is even less correlated with the various "need" variables than are its component parts, as can be ascertained by examining the fiscal capacity column of the correlation matrix. The "capacity" or "ability" variables therefore are indicated to be sufficiently independent of the "need" or "demand" variables (at the level of assurance that can be derived from a simple correlation matrix) to justify the methodology of estimating fiscal capacity by the use of "capacity" variables alone. There, of course, may be other important "need" or "demand" variables which have not been considered, and which if included might prove to explain some variance in PLREV that is now being accounted for by "capacity" variables. However, all that can be done in any regression analysis is to include the variables which seem relevant and to assume that if the R^2 is high no important variables have been omitted.

A second method of testing for the appropriateness of using only "ability" variables to measure fiscal capacity is to carry out two separate

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dissertation is derived. See Harvey E. Brazer et al., 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). A short discussion of "need" also appears on page 80 infra.

regression analyses, one containing the derived variable FC along with all the "need" variables under consideration, and the other containing each of the independent variables used to estimate fiscal capacity along with the same "need" variables, and to examine the coefficients on the "need" variables in each case. If the "need" variables explain appreciably more of the variance in PLREV when combined in an equation with the individual "capacity" variables than they explain when combined only with the derived variable FC, it can be implied that in the two-step process the "capacity" variables are explaining part of the variance that would otherwise be explained by "need" or "demand" variables. This would imply that the derived fiscal capacity measure explains not only the ability to raise revenues to pay for public goods and services, but also part of the actual "need" or "demand" for public goods and services, which is independent of ability to pay. The same type of test can be made by comparing the coefficients and "t" statistics on the "capacity" variables themselves in two alternative equations--the PLREV estimating equation which contains only "capacity" variables and the equation containing both "capacity" and "need" variables. If the coefficients and "t" statistics on the "capacity" variables drop appreciably when the "need" variables are added it can be implied that the "capacity" variables are explaining variance in the fiscal capacity estimating equation which is explained by "need" variables when the two types of variables are combined in one estimating equation. The results of the regression analyses necessary for these two tests of the independence of our independent variables are shown in Table 2.

Examination of the first two columns of Table 2 leads to favorable conclusions regarding the independence of the "capacity" variables. The coefficients on the "capacity" variables are almost identical in the two

TABLE 2

REGRESSION COEFFICIENTS AND "t" STATISTICS FOR THREE ALTERNATIVE PLREV ESTIMATION EQUATIONS

Independent variables	Fiscal capacity (FC) estimating equation (R^2 = .8361)		Equation containing both "need" and "ability" variables (R^2 = .8747)		Equation containing "need" variables plus the variable FC (R^2 = .8737)	
	Coeffi-cients	"t" statis-tics	Coeffi-cients	"t" statis-tics	Coeffi-cients	"t" statis-tics
Constant	-29.223	-1.28	-135.156	-1.20		
MFI	.027	5.62	.025	2.69		
PRESID	.003	0.49	.003	0.47		
PCOM	.042	6.96	.048	7.99		
PINDUST	.025	5.67	.025	5.75		
PSEASON	.016	2.94	.019	3.44		
POTHER	.175	6.74	.185	5.98		
FC					1.091	18.67
AREA			-.011	-0.88	-.011	-1.08
DENSITY			.099	1.88	.093	1.90
DENSQ			-.0007	-2.08	-.0007	-2.08
ADCPOP			1.499	0.71	2.243	1.89
ACHU			.047	0.54	.058	0.71
ENPOP			45.459	3.59	45.113	3.71
AGED			-.063	-0.22	.001	0.01
CHILD			-.077	-0.20	-.070	-0.20
NONWH			-.045	-0.18	.018	0.09
POP			-.0001	-0.84	-0.00008	-0.74
CRIME			.105	0.07	-.494	-0.73

cases. More evidence of independence is provided by the fact that each "capacity" variable remains highly significant, according to the "t" test criterion, when the "need" variables are added to the regression equation in the second column.

A comparison of the second and third columns of the above table lends more credence to this belief of independence. The coefficients on all of the "need" variables remain in the same range. It is also notable that every "need" variable that is significant, according to the "t" test, in the equation in which "need" and "capacity" variables interact, is also significant in the equation in which the estimated fiscal capacity (FC)

is used as an independent variable along with the "need" variables. Not only are the same variables significant in each equation but the coefficients on the "significant" variables are almost identical in the two equations. The changes in coefficients which do appear, on inspection, to be relatively large do not occur for variables which are significant. Since in a more thorough analysis of "need" the non-significant variables would be removed, it is the relationship of "capacity" variables and those "need" variables which are significantly different from zero that is of major concern to us. On the strength of the evidence from these three regression equations the conclusion is reached that the "capacity" variables are sufficiently independent of the non-capacity variables to justify the use of these variables alone in the fiscal capacity estimating equation.

CHAPTER V

RESULTS: ESTIMATION OF FISCAL CAPACITY AND EFFORT FOR 104 NEW YORK STATE SCHOOL DISTRICTS

Method: Summarization

The results of our ordinary least squares regression analysis using median family income and the five per capita values of property types as independent variables are presented in detail in Table 3. All of the regression coefficients are consistent with our hypotheses and all are statistically significant except the coefficient on per capita residential property (PRESID). The per capita amount of locally raised governmental revenue varies directly with income and taxable value of each of the five classes of property. On the average, holding the other variables constant, a one-dollar difference in median family income is associated with a marginal difference of 2.7 cents in per capita tax receipts. For the property value variables we find a considerable range in the relationships indicated by the net regression coefficients, from a 17.5-cent response in the same direction for "Other" property[1] to an increase in per capita tax receipts of only .3 cents for each dollar increase in per capita taxable value of residential property.

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[1]This extremely high indicated response ratio may be accounted for by the inclusion in "Other" property of "Special franchises" which are subject to property taxes at local rates on their assessed value as assessed by the State, and the inclusion of "Private forest land," which is not only taxed but also usually co-exists with state-owned forest land upon which an in-lieu-of tax is paid by the State at prevailing local rates.

TABLE 3

RESULTS OF ORDINARY LEAST SQUARES REGRESSION ANALYSIS,
PER CAPITA LOCALLY RAISED GOVERNMENTAL REVENUES

Dependent variable[a] Locally raised governmental revenue (PLREV)[b] (dollars per capita)	Independent variables: Constant term	Median family income (MFI)[b] (dollars)	Residential property (PRESID)[b] (dollars per capita)	Commercial property (PCOM)[b] (dollars per capita)	Industrial property (PINDUST)[b] (dollars per capita)	Seasonal property (PSEASON)[b] (dollars per capita)	Other property (POTHER)[b] (dollars per capita)
Regression coefficient	-29.223	.027	.003	.042	.025	.016	.175
"t" statistic[c]	- 1.287	5.623	0.493	6.965	5.673	2.936	6.749
Mean of variable	1.000	6,249	3,144	918	959	610	301
Coefficient of partial determination		.174	.014	.210	.235	.198	.290

Coefficient of multiple determination (R^2) = .836

Number of observations = 104

[a]For correlation matrix including the dependent and all the independent variables plus size, see Appendix C.

[b]For definitions of variables see Appendix B.

[c]Coefficient divided by standard error of estimate.

Coefficients of partial determination, which are obtained by multiplying the beta coefficient by the simple correlation coefficient, provide approximations to the proportion of variance explained by each independent variable. The coefficient of partial determination for a variable can be said to represent the percentage of variation in the dependent variable explained by the independent variable in question after all other independent variables have been taken into account. It must be realized, however, that any process of allocating total explanatory power among the independent variables must arbitrarily divide that part of the explained variance which is due to combinations of the variables. While the coefficient of multiple determination can indicate how much of total variance is explained by all of the independent variables combined, part of this determination is due to joint effects of variables. Dividing this joint explanatory power is simply impossible.

The approximations of relative explanatory power contained in the coefficients of partial determination suggest that, from most to least powerful, the variables should be ranked in the following order:

Variable	Coefficient of partial determination (from Table 3)
POTHER	.290
PINDUST	.235
PCOM	.210
PSEASON	.198
MFI	.174
PRESID	.014

The variables ranked in order of relative approximate variance explaining power conform closely to our hypothesis. Industrial, commercial, and seasonal property are much more powerful in terms of explaining variance in actual tax collections than is residential property. Median family income explains less of the variance than do each of the non-

residential property types but explains more than does residential property.

In combination our income and five property value variables account for or explain 84 per cent of the variance in per capita local tax receipts, or more than 1.15 as much as our equation (1) in which we did not distinguish among classes of real property. Thus we can be confident that our estimating equation is capturing most of the forces that give rise to variance among local governments operating within school districts in tax receipts or locally raised governmental revenue per capita.

Results by School District

For each district area the estimated level of per capita local tax revenue is our measure or index of local fiscal capacity. The amounts, computed from the equation presented in Table 3, are to be found in column (2) of Table 4.[2] For our sample of 104 school districts they range from $865 per capita in the Town of Webb school district, comprised of the towns of Webb and Inlet in Herkimer County, to $110 for Troupsburg in Steuben County. The City of Buffalo is slightly above the median value at $215. Yonkers, with fiscal capacity estimated at $329, ranks 21 in the sample and is by far the highest among the "Big Five" cities (excluding New York City).

Once the fiscal capacity measure has been derived possible applications are numerous. In Table 4 school districts have been classified

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[2]Estimates of fiscal capacity based upon representatives of the major alternative methods--income alone (MFI), property values alone (PTPROP), a (regression weighted) combination of income and property values (REGRESS), plus our fiscal capacity estimating method (FC)--and actual revenues raised by local governments (PLREV) are listed and ranked in Appendix D for comparison purposes.

TABLE 4

ESTIMATES OF FISCAL CAPACITY PER CAPITA AND RELATIVE TAX EFFORT, 1967-68

County and district	(1) Actual local revenue (PLREV)[a] (dollars per capita)	Rank	(2) Estimated fiscal capacity (FC)[a,b] (dollars per capita)	Rank	(3) Residual Col. (1)-(2) (RESIDUAL) (dollars per capita)	Rank	(4) Effort (1)/(2) (EFFORT)[a] (per cent)	Rank
			"Big Five"					
Albany								
Albany	192	70	255	37	- 64	92	75	95
Erie								
Buffalo	209	62	215	61	- 6	54	97	55
Monroe								
Rochester	276	37	285	28	- 8	58	97	56
Onondaga								
Syracuse	253	45	259	35	- 5	53	98	52
Westchester								
Yonkers	257	44	329	21	- 72	97	78	92
Mean	237		268		- 31		89	
Standard deviation	36		42		34		11	
			Upstate suburbs					
Albany								
Cohoes	157	88	179	89	- 22	69	88	77
Green Island	190	72	240	48	- 50	86	79	90
Menands	531	8	625	4	- 94	100	85	80
Watervliet	121	100	191	76	- 70	95	63	100

Erie								
Grand Island	298	28	266	32	33	26	112	28
Kenmore	275	38	306	26	- 31	76	90	69
Lackawanna	485	10	488	7	- 2	50	100	49
Tonawanda	239	52	223	54	16	36	107	38
Monroe								
E. Rochester	264	42	238	50	26	28	111	31
Irondequoit-E. Irondequoit	210	61	261	34	- 51	87	80	86
Niagara								
N. Tonawanda	240	51	217	59	23	30	111	33
Onondaga								
Solvay	375	19	351	19	24	29	107	39
Rensselaer								
Rensselaer	185	76	221	55	- 36	81	84	82
Saratoga								
Waterford	150	92	214	63	- 65	93	70	99
Mean	266		287		- 21		88	
Standard deviation	125		125		41		16	

Downstate suburbs

Nassau								
Floral Park	280	35	352	18	- 72	96	80	89
Garden City	623	3	499	6	124	2	125	13
Glen Cove	345	25	280	29	65	14	123	17
Hempstead	402	15	353	17	48	21	114	24
Suffolk								
Babylon	288	32	250	42	38	25	115	23
Lindenhurst	291	31	186	85	105	4	156	1
Shelter Island	555	6	697	2	-142	104	80	88
Westchester								
Bronxville	622	4	695	3	- 73	98	90	71
Hastings-on-Hudson	389	16	307	25	82	9	127	10
Mount Vernon	281	34	314	23	- 33	77	89	72

TABLE 4--Continued

County and district	(1) PLREV	Rank	(2) FC	Rank	(3) RESIDUAL	Rank	(4) EFFORT	Rank
New Rochelle	346	24	340	20	6	42	102	44
Pelham	417	14	420	12	- 3	51	99	50
Pleasantville	447	11	362	16	86	7	124	15
Rye-Rye Neck	536	7	479	9	58	16	112	29
Somers	251	47	269	31	- 18	67	93	64
Tuckahoe	438	12	373	14	65	13	117	22
White Plains	428	13	485	8	- 57	89	88	74
Mean	408		392		16		108	
Standard deviation	119		142		74		20	
Independent cities								
Broome								
Binghamton	371	21	248	44	12	40	150	2
Vestal	244	48	253	39	- 9	60	96	57
Cattaraugus								
Olean	195	69	204	69	- 9	61	95	60
Chautauqua								
Jamestown	279	36	193	74	86	8	144	3
Chemung								
Elmira	269	40	215	62	55	19	126	12
Clinton								
Plattsburgh	216	57	190	77	26	27	114	26
Dutchess								
Poughkeepsie	274	39	252	40	22	32	109	35
Fulton								
Gloversville	165	84	167	97	- 2	49	99	51
Johnstown	181	77	199	71	- 18	65	91	67
Watertown	221	54	202	70	19	35	110	34

Montgomery								
Amsterdam	158	87	175	93	- 17	63	90	68
Niagara								
Lockport	320	27	249	43	71	12	129	7
Newfane	203	64	189	82	14	38	108	37
Niagara Falls	296	29	240	49	56	18	124	16
Oneida								
New Hartford	161	85	273	30	-112	103	59	102
Utica	211	60	219	57	- 8	57	96	58
Otsego								
Oneonta	171	81	179	90	- 8	59	95	61
Schenectady								
Schenectady	220	55	227	53	- 6	55	97	54
Steuben								
Corning	215	58	240	47	- 26	73	89	73
Warren								
Glens Falls-Abraham Wing	282	33	231	52	51	20	122	18
Mean	233		217		15		107	
Standard deviation	58		30		50		21	
			Other					
Cattaraugus								
Randolph	168	82	192	75	- 24	71	88	76
Cayuga								
Moravia	154	89	172	96	- 18	65	90	70
Chautauqua								
Southwestern	199	66	184	86	15	37	108	36
Westfield	204	63	199	72	5	43	103	42
Delaware								
Andes	212	59	191	78	21	33	111	32
Dutchess								
Pawling	257	43	255	38	2	46	101	47

TABLE 4--Continued

County and district	(1) PLREV	Rank	(2) FC	Rank	(3) RESIDUAL	Rank	(4) EFFORT	Rank
Essex								
Crown Point	198	68	177	91	21	33	112	30
Keene	511	9	419	13	92	6	122	19
Moriah	192	70	184	88	8	41	104	40
Newcomb	786	2	615	5	171	1	128	9
Ticonderoga	224	53	242	46	- 18	64	93	65
Willsboro	242	50	257	36	- 16	62	94	62
Fulton								
Wheelerville	586	5	464	10	122	3	126	11
Genesee								
Elba	179	79	184	87	- 5	52	97	53
Greene								
Cairo	322	26	251	41	71	11	128	8
Durham	292	30	234	51	58	17	125	14
Herkimer								
Town of Webb-Inlet	807	1	865	1	- 58	90	93	63
Jefferson								
Alexandria	252	46	211	68	41	22	120	21
Hounsfield	139	95	174	94	- 35	79	80	87
Lyme	266	41	188	83	78	10	141	4
Thousand Islands	218	56	214	64	4	44	102	43
Lewis								
Harrisville	174	80	174	95	0	48	100	48
Livingston								
Livonia	198	67	243	45	- 44	83	82	84
Oneida								
Bridgewater	132	98	161	100	- 29	75	82	83
Waterville	139	95	176	92	- 37	82	79	91
Orange								
Highland Falls	58	104	167	97	-109	102	35	104
Minisink Valley	135	97	221	56	- 86	99	61	101

Orleans								
Holley	144	94	190	79	- 47	85	76	94
Oswego								
Altmar-Parish	180	78	188	83	- 8	56	96	59
Otsego								
Edmeston	120	102	156	102	- 36	80	77	93
Gilbertsville	129	99	127	103	2	47	101	45
Rensselaer								
Schodack	158	86	212	67	- 54	88	75	96
St. Lawrence								
Clifton-Fine	357	23	317	22	40	23	113	27
Saratoga								
Corinth	188	74	213	65	- 25	72	88	75
Schoharie								
Schoharie	114	103	160	101	- 45	84	72	97
Steuben								
Troupsburg	149	93	110	104	40	24	136	5
Sullivan								
Eldred	360	22	426	11	- 66	94	85	81
Fallsburgh	384	17	290	27	94	5	132	6
Tompkins								
Lansing	381	18	367	15	14	39	104	41
Newfield	189	73	166	99	23	31	114	25
Ulster								
Saugerties	151	91	212	66	- 61	91	71	98
Warren								
Johnsburg	242	49	263	33	- 20	68	92	66
Washington								
Fort Ann	121	100	219	58	- 98	101	55	103
Putnam	374	20	309	24	64	15	121	20
Whitehall	166	83	189	80	- 23	70	88	78
Wayne								
Sodus	154	90	189	81	- 35	78	82	85
Wayne	187	75	216	60	- 28	74	87	79
Williamson	199	65	197	73	2	45	101	46

TABLE 4--Continued

	(1) PLREV	Rank	(2) FC	Rank	(3) RESIDUAL	Rank	(4) EFFORT	Rank
Mean	244		244		0		98	
Standard deviation	155		130		56		22	
Total sample								
Mean	270		270		0		100	
Standard deviation	141		128		57		21	
New York City	346[c]		309		37		112	

[a]For definitions see text or glossary.

[b]Figures may not add due to rounding.

[c]Includes local property taxes for higher education. All other data for New York City exclude taxes, expenditures, and state and federal aid for higher education.

as large city ("Big Five"), large city suburb (Upsub), New York City suburb (Dnsub), independent city of less than 100,000 population (IC), and other areas of the State (Other), so that the FC measure can be used to compare the mean fiscal capacity of these subclassifications of the total sample. Though New York City data were not included in the observations used for obtaining the estimating equation the New York City school district fiscal capacity (FC) has been estimated and included in this comparison.[3] It can be seen that ability to raise revenues does differ among the types of areas. The suburbs and New York City appear

Means of Estimated Fiscal Capacity for Chosen Subsamples (from Table 4)

Subsample	Mean
"Big Five"	$268
Upsub	287
Dnsub	391
IC	217
Other	244
New York City	309
Total sample	270

to have higher than average fiscal capacity while the large cities other than New York City have approximately average revenue raising ability and the other areas and smaller independent cities are least able in dollars per capita terms to provide governmental services at the local level.

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[3]Fiscal capacity for New York City is estimated by fitting New York's relevant income and property value figures into our estimating equation. It was decided not to use New York City data in the actual process of estimation because New York City is so different from the other cities of New York State and even of the nation. It should be understood that the appearance of New York City estimates in our tables is meant to provide some idea of where New York City fits relative to the sample districts but is not meant to suggest that we believe our estimating processes capable of estimating relationships that necessarily hold for New York City.

Whenever units of observation are subdivided on some basis (in the above case the basis for classification is essentially city, suburb, other) and results for the subgroups are compared, the question of the significance of observed differences among the groups must be raised. In other words, can we believe that the different classes into which school districts have been divided differ systematically in fiscal capacity? If the classes do differ significantly it is evidence that some characteristic(s) (such as degree of urbanization) which varies among these subclasses is correlated with fiscal capacity. If this is found to be true it implies that the classification system is meaningful, in the sense that fiscal capacity does differ among the classes so disaggregated. On the other hand, determining that the differences among subclasses could with a high degree of probability occur by chance would imply that the null hypothesis--the classes so divided do not differ significantly in fiscal capacity--should not be rejected.

Analysis of variance is a useful statistical technique for testing the significance of observed differences among subclasses of a sample.[4] The actual test is to determine whether the variance (squared standard deviation) among classes differs significantly from the variance within classes. If the division of observations into classes is purely random, the differences among the class means will reflect the same random factors that account for variation within each of the classes. The null hypothesis is that the variance between class means is equal to the variance around the mean within classes, or:

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[4]Frederick C. Mills, Statistical Methods, 3rd ed. (New York: Henry Holt and Company, 1955), pp. 541-556.

$$F = \frac{S_1^2}{S_2^2} = \frac{\text{variance between class means}}{\text{variance within classes (around class means)}} = 1$$

The ratio of these variances is distributed as an "F" distribution. For 104 observations subdivided into five classes an "F" value of 2.3 (3.2) or greater indicates that, at the 95 (99) per cent level of confidence, the differences in variance are significant.

The "F" value calculated for the large city, large city suburbs, New York City suburbs, independent city, and "other" classifications is 6.32, so the null hypothesis is rejected. The rejection of the null hypothesis implies that the differences in fiscal capacity among the classes are not random. Some characteristic(s) that varies among these classes leads to non-random differences in fiscal capacity. This statistical test lends credence to the generalization that fiscal capacity per capita does significantly vary among large cities, two types of suburbs, smaller cities, and other areas of New York State.

Given the evidence that fiscal capacity differences among the classes in the above classification system are significant, it is informative to test whether population size is the underlying factor that explains these differences. When the 104 districts are classified by population size (100,000 and greater; 50,000 to 99,999; 25,000 to 49,999; 10,000 to 24,999; and less than 10,000), however, the "F" value is only .19, and the null hypothesis is not rejected. These two results combined seem to imply that it is not size or anything highly correlated with population size that causes the small independent cities to have the smallest average per capita fiscal capacity and the New York City suburbs to have the largest. Based upon this evidence it can be inferred that it is incorrect to make generalizations about fiscal capacity's relationship to school

district population size (at least when population is divided into the above five size classes).

Once the fiscal capacity of each school district is estimated a useful and informative exercise involves comparison of fiscal capacity with actual local revenues raised. From such a comparison can be ascertained the extent to which individual districts utilize the local revenue raising capacity which they possess. The results of this comparison are shown in Table 4. It is obviously worthwhile to have estimates not only of how much fiscal capacity exists, but also of the number of unutilized fiscal capacity dollars per capita (the number will be negative in high tax effort districts) and of the percentage of estimated fiscal capacity which is being employed, as reflected in actual revenue collections. In percentage terms the ratio of actual local governmental revenue to fiscal capacity is often designated as "effort" because it represents the comparison of actual revenue collections to capacity to collect revenue. An "effort" measure of 100 per cent indicates that actual local governmental revenues collected are exactly equal to the revenue collections predicted by regression analysis on the basis of local income levels and property value and types. "Effort" of greater than 100 per cent indicates more than the predicted or "normal" collections for the given levels of the predictor variables in the district, while "effort" of less than 100 per cent denotes less than the predicted collections. A district with an "effort" index of 80 per cent can be said to be collecting only 80 per cent of the predicted "collectable" revenues given its mix of levels of median family income and the five per capita property values. It is "effort" measures of this type that are often components in matching grant formulas. The rationale for using "effort" measures in this context

seems to be more or less a "bastardization" of the Puritan work ethic, "Those who put forth effort on their own behalf shall be rewarded, and those who do not, shall not."[5] Assuming that per capita "needs" are equal, redistribution among districts of amounts varying directly with fiscal capacity accomplishes the goal of providing aid to those least able to finance needed public services locally. But the practice of reducing aid levels or matching ratios for a district of low fiscal ability if it does not exert high "effort" seems questionable. The degree to which a district utilizes or does not utilize its local resources appears to be irrelevant information in making a judgment about the outside funds necessary for provision of a given dollar level of services. Of course the problem is more complicated than the above discussion would suggest since little basis exists for assuming that "needs" per capita (in dollar terms) are equal for all localities. But knowledge of "needs" is not necessary in order to state that if the goal of state aid is providing the dollars necessary to close the gap between local capacity and local "needs" aid amounts should not vary on the basis of "effort."

"Effort" is computed here because the measure is meaningful and of interest for the purpose of comparison of local utilization of fiscal capacity. "Effort" is not suggested as a basis upon which aid should be distributed. "Effort" is not necessarily correlated with either fiscal capacity or "need," or the difference between these two. Only if the aid goal is the reward of effort should effort be used as a basis for aid levels or matching ratios.

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[5]Another rationalization of the use of effort in matching formulas is that by giving additional aid to high "effort" units the negative effects on revenues raised of interlocal tax competition can to some extent be counteracted.

In Tables 5 and 6 we present the relative fiscal effort estimates for the sample districts in which this measure exceeds 125 per cent and those in which it falls below 75 per cent, respectively. Perhaps the most significant fact that emerges from Table 5 is that the list does not include any of the "Big Five" (that is, Big Six excluding New York City) cities of Buffalo, Rochester, Albany, Syracuse, and Yonkers. Rather, one-half of the school districts included serve smaller cities like Lockport, Jamestown, and Binghamton, and the suburbs of the "Big Five" and New York City, such as Lindenhurst in Suffolk County and Hastings-on-Hudson in Westchester County. Our evidence does not suggest that the total tax effort relative to fiscal capacity for all local purposes--school and non-school--tends to be especially high in the State's larger cities, excluding New York City. For New York City estimated effort is 112 per cent which, while not putting it above our arbitrary high effort cutoff, certainly distinguishes it from the other large cities, none of which reaches the mean effort level of 100 per cent.

However, as may be seen in Table 6, in none of the "Big Five" cities do taxes levied for county, city, and school purposes fall as much as 25 per cent below their estimated fiscal capacity.[6] It is interesting that suburban districts are found more frequently among the low fiscal effort units of Table 6 than among the high effort districts of Table 5. The predominant group in Table 6 is the "Other" districts. Of the total of 48 such districts in our sample, six, or exactly one-eighth of them, are putting forth relatively low tax efforts. It is difficult to attribute any significance to this fact, however, when it is noted that

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[6]But both Albany and Yonkers fall more than 20 per cent below their estimated fiscal capacity.

TABLE 5

SCHOOL DISTRICTS IN WHICH LOCAL TAX RECEIPTS EXCEEDED ESTIMATED FISCAL CAPACITY BY 25 PER CENT OR MORE, 1967-68[a]

District	Type	Relative fiscal effort (per cent)[b]
Lindenhurst	(S)	156
Binghamton	(IC)	150
Jamestown	(IC)	144
Lyme	(O)	141
Troupsburg	(O)	136
Fallsburgh	(O)	132
Lockport	(IC)	129
Cairo	(O)	128
Newcomb	(O)	128
Hastings-on-Hudson	(S)	127
Wheelerville	(O)	126
Elmira	(IC)	126

Totals:			
	"Big Five" cities	(C)	= 0
	Independent cities	(IC)	= 4
	Suburbs	(S)	= 2
	Other	(O)	= 6
			12

[a]Adapted from Table 4, column (4).

[b]100 per cent equals average effort.

TABLE 6

SCHOOL DISTRICTS IN WHICH LOCAL TAX RECEIPTS FELL SHORT OF ESTIMATED FISCAL CAPACITY BY 25 PER CENT OR MORE, 1967-68[a]

District	Type	Relative fiscal effort (per cent)[b]
Highland Falls	(O)	35
Fort Ann	(O)	55
New Hartford	(IC)	59
Minisink Valley	(O)	61
Watervliet	(S)	63
Waterford	(S)	70
Saugerties	(O)	71
Schoharie	(O)	72
Schodack	(O)	75

Totals:

"Big Five" cities	(C)	= 0
Independent cities	(IC)	= 1
Suburbs	(S)	= 2
Other	(O)	= 6
		9

[a] Adapted from Table 4, column (4).

[b] 100 per cent equals average effort.

there are also six "Other" districts in the high effort category. That only one small independent city is included in the low effort table, while four are exerting high effort, is probably more noteworthy.

Some portion of the variance in effort may be accounted for by such institutional factors as the differences in taxing powers and in tax rate limitations imposed either by the Legislature or by the Constitution.[7] We find, for example, wide variation in taxing authority with respect to both property and non-property taxes between New York City and the "Big Five" cities, between these larger cities and cities with populations of less than 125,000, and between cities in general and towns and villages. Our analysis suggests that of the Big Six cities only New York City collects taxes in an amount as large as its estimated fiscal capacity and that this may be explained, at least in part, by the fact that these cities are required to function under more severe constraints on their taxing powers than other local units in the State, as can be seen by examining Table A-1 of Appendix A (page 117). Much of the remaining variance in relative fiscal effort may be accounted for by differences among districts in fiscal needs as these are perceived by their resident-voter-taxpayers.

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[7] See Appendix A, pages 113-118.

CHAPTER VI

ESTIMATION OF FISCAL CAPACITY AVAILABLE FOR EDUCATION AND OF NEED FOR ADDITIONAL STATE AND FEDERAL AID

Background

The derivation of total local fiscal capacity (FC) was the major goal of this dissertation. Two less central but also important goals are application of this local fiscal capacity index in the estimation of local fiscal capacity available for one specific purpose (in this case education), and use of the FC measure in a procedure for obtaining guidelines for additional state and federal aid to localities.

As has been emphasized from the beginning of this study the fiscal capacity index (FC) which is derived and applied to estimate the actual fiscal capacity of 104 New York State school district units for 1967-68 is a measure of the combined ability to raise tax revenues of all local governments having taxing powers over the residents and resources of the geographic area of each school district. This estimated fiscal capacity cannot be said to be the fiscal capacity of the 104 school district governments as they are now established by New York law. Educators, legislators, and other interested persons, however, may wish to estimate the ability of school districts to raise revenues for school operating purposes alone. Even though it is impossible to speak of fiscal capacity except as ability to raise total governmental revenues in a geographic area, it should be possible to estimate the "need" for public services

for all purposes except education in the given area; to subtract the dollar-valued "needs" from total local fiscal capacity; and thus to derive a residual which can in some sense be defined as "fiscal capacity available for education" (or analogously for any other specific purpose). The major problem in obtaining this estimate, given an estimate of total local fiscal capacity, is estimation of "needs" for local public non-education purposes.

"Needs"

Though the "need" for revenue to provide local public goods and services can be estimated in ways varying from asking "experts" to arbitrarily setting a per capita dollar figure, it is necessary to be able to estimate "needed" dollars in order to derive a quantitative estimate of the amount of fiscal capacity remaining for some specific purpose after these "needs" have been financed. The method of "need" estimation I have chosen to apply here is taken from a joint effort study of New York State fiscal relations of which the analysis contained in this dissertation underlies one major part.[1] Deriving a methodology for estimating "needs" is obviously a dissertation-size study in itself and will not be described at any length in this thesis. The choice not to treat this topic more fully also rests upon the fact that alternative per capita "needs" estimates would be equally suited for the purpose served by the measure here selected. While it is necessary for our purposes that a dollar estimate of non-education local public "needs" be used, the method for obtaining this estimate is in no way constrained to that one chosen.

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[1] Harvey E. Brazer et al., Fiscal Needs and Resources: A Report to the New York State Commission on the Quality, Cost and Financing of Elementary and Secondary Education.

Once we obtain estimates of non-education "needs" for our 104 sample districts the movement from total local fiscal capacity to local fiscal capacity available for education is straightforward. Subtraction of dollar non-education "needs" from dollar revenue raising capacity (FC) results in an estimate of residual dollars available for the provision of education. This measure is designed to provide an estimate of local school district capacity to provide dollar amounts of education services, given the assumptions that "needs" for other local public services can be measured, and that these other "needs" are fully provided for from local total fiscal capacity (FC) plus local non-education aid from the state and federal levels.

In the New York State study the methodology for deriving need estimates is relatively simple. All governmental services are divided into eight broad categories,[2] and the actual expenditure on each of these types of governmental services is estimated by means of multivariate regression analysis.[3] The independent variables used for estimating each category of expenditure are estimated fiscal capacity (FC) and various socio-economic variables - chosen because of a priori belief that they represent need, not simply taste, for the given services. Once these equations are estimated it is necessary to remove the effects of fiscal capacity from the estimates in order to obtain "need" estimates. In other words, what is implied is that "need" can be estimated by removing the effect of differences in fiscal capacity from the results obtained

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[2]The categories are General Government; Public Safety; Highways; Sanitation; Health; Culture, Natural Resources, and Recreation; Welfare; and Other Government Expenditure.

[3]The sample-wide average per capita expenditure is used for "Other Government Expenditure" instead of a regression estimated value. This category contains various odd expenditures and is not amenable to regression estimation.

by estimating, through multivariate regression analysis, the expenditures on public services given the "need" factors of the community (as represented by the "non-fiscal capacity" independent variables). This removal is accomplished by substituting the value of mean fiscal capacity for actual fiscal capacity of each district in each "need" estimating equation. The result is a set of eight "need" equations reflecting the expected expenditures on each type of public service by communities with varying "need factors" but with equal financial capacity (the average) to supply these needs. The need measures derived in this manner reflect expected demands for public services given the socio-economic make-ups of districts and the fact that the demand increasing or retarding effects of high or low fiscal capacity have been eliminated. Table 7 presents the results of the summation of these eight "need" estimates for each of the 104 districts in our sample.[4]

Relative "Needs"

As is obvious from Table 7, "needs" estimated in the above manner do differ significantly among districts and among types of districts. Subtracting total local non-school "needs" from total local fiscal capacity provides results which may enable us to gain certain insights into the relative ability of districts (and types of districts) to finance education after other public services are provided.

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[4]Total "needs" (NEEDTOT) were estimated, then state and federal aid were subtracted in order to derive figures representing needs for local expenditures, given the present state and federal aid systems (NETTOT).

TABLE 7

ESTIMATES OF LOCAL "NEED" FOR NON-SCHOOL REVENUES PER CAPITA AND FISCAL CAPACITY AVAILABLE FOR EDUCATION

County and district	(1) Estimated fiscal capacity (FC)[a] (dollars per capita)	Rank	(2) Total non-school need (NEEDTOT)[a] (dollars per capita)	Rank	(3) Need for local non-school revenue (NETTOT)[a,b] (dollars per capita)	Rank	(4) Fiscal capacity available for education (1)-(3) (FCSC)[a,c] (dollars per capita)	Rank
			"Big Five"					
Albany								
Albany	255	37	245	22	171	12	84	55
Erie								
Buffalo	215	61	267	4	202	1	13	95
Monroe								
Rochester	285	28	246	20	168	15	116	34
Onondaga								
Syracuse	259	35	241	30	157	32	102	42
Westchester								
Yonkers	329	21	228	58	159	26	170	23
Mean	268		245		172		97	
Standard deviation	42		14		18		57	
			Upstate suburbs					
Albany								
Cohoes	179	89	227	62	157	31	22	90
Green Island	240	48	219	76	150	45	90	52

Menands	625	4	221	72	40	104	585	4
Watervliet	191	76	229	56	168	17	23	89
Erie								
Grand Island	266	32	207	95	118	89	148	28
Kenmore	306	26	225	67	139	63	167	24
Lackawanna	488	7	236	46	51	103	437	6
Tonawanda	223	54	230	54	154	37	70	57
Monroe								
E. Rochester	238	50	205	97	123	81	115	35
Irondequoit-E. Irondequoit	261	34	209	91	160	23	101	44
Niagara								
N. Tonawanda	217	59	208	94	132	76	85	54
Onondaga								
Solvay	351	19	203	98	51	102	300	12
Rensselaer								
Rensselaer	221	55	229	55	129	78	92	48
Saratoga								
Waterford	214	63	208	93	162	21	52	71
Mean	287		218		124		163	
Standard deviation	125		11		45		166	

Downstate suburbs

Nassau								
Floral Park	352	18	240	35	177	8	175	21
Garden City	499	6	239	38	141	60	358	9
Glen Cove	280	29	233	50	176	10	104	41
Hempstead	353	17	255	14	191	4	162	25
Suffolk								
Babylon	250	42	232	52	160	24	90	51
Lindenhurst	186	85	224	71	136	68	50	72
Shelter Island	697	2	256	12	63	100	634	2
Westchester								
Bronxville	695	3	241	32	92	97	602	3

TABLE 7--Continued

County and district	(1) FC	Rank	(2) NEEDTOT	Rank	(3) NETTOT	Rank	(4) FCSC	Rank
Hastings-on-Hudson	307	25	213	87	135	69	172	22
Mount Vernon	314	23	239	37	178	7	136	31
New Rochelle	340	20	228	59	154	35	186	20
Pelham	420	12	218	77	121	83	299	14
Pleasantville	362	16	212	88	113	91	248	16
Rye-Rye Neck	479	9	214	85	120	87	359	8
Somers	269	31	185	101	121	85	149	27
Tuckahoe	373	14	227	61	128	80	245	17
White Plains	485	8	236	48	135	70	349	10
Mean	392		229		138		254	
Standard deviation	142		17		33		166	
Independent cities								
Broome								
Binghamton	248	44	240	36	116	90	131	32
Vestal	253	39	175	102	112	92	141	29
Cattaraugus								
Olean	204	69	238	41	150	46	54	70
Chautauqua								
Jamestown	193	74	237	43	132	77	61	62
Chemung								
Elmira	215	62	241	33	160	25	55	69
Clinton								
Plattsburgh	190	77	236	47	128	79	62	60
Dutchess								
Poughkeepsie	252	40	243	26	140	62	112	36
Fulton								
Gloversville	167	97	241	31	149	49	17	92
Johnstown	199	71	236	45	153	39	45	75

Watertown	202	70	239	39	137	67	65	58
Montgomery								
Amsterdam	175	93	249	17	139	65	35	83
Niagara								
Lockport	249	43	217	80	142	58	107	40
Newfane	189	82	217	78	149	48	39	80
Niagara Falls	240	49	231	53	147	51	93	47
Oneida								
New Hartford	273	30	215	83	121	86	152	26
Utica	219	57	246	21	158	28	62	61
Otsego								
Oneonta	179	90	224	68	139	64	40	79
Schenectady								
Schenectady	227	53	227	60	168	16	58	66
Steuben								
Corning	240	47	237	42	148	50	92	49
Warren								
Glens Falls-Abraham Wing	231	52	226	63	143	55	88	53
Mean	217		231		142		76	
Standard deviation	30		16		14		37	
			Other					
Cattaraugus								
Randolph	192	75	244	23	164	20	28	86
Cayuga								
Moravia	172	96	226	64	158	27	14	94
Chautauqua								
Southwestern	184	86	217	81	152	42	32	85
Westfield	199	72	242	29	173	11	26	87
Delaware								
Andes	191	78	240	34	132	75	59	64
Dutchess								
Pawling	255	38	198	99	146	52	109	39

TABLE 7--Continued

County and district	(1) FC	Rank	(2) NEEDTOT	Rank	(3) NETTOT	Rank	(4) FCSC	Rank
Essex								
Crown Point	177	91	237	44	141	59	36	82
Keene	419	13	274	3	120	88	299	13
Moriah	184	88	242	28	145	54	39	81
Newcomb	615	5	282	2	96	95	519	5
Ticonderoga	242	46	243	24	133	73	109	38
Willsboro	257	36	250	16	140	61	117	33
Fulton								
Wheelerville	464	10	265	6	62	101	402	7
Genesee								
Elba	184	87	208	92	134	71	49	73
Greene								
Cairo	251	41	239	40	154	36	96	46
Durham	234	51	220	74	133	72	101	43
Herkimer								
Town of Webb-Inlet	865	1	314	1	122	82	743	1
Jefferson								
Alexandria	211	68	266	5	150	47	61	63
Hounsfield	174	94	243	25	170	13	4	98
Lyme	188	83	255	13	143	56	45	76
Thousand Islands	214	64	262	9	157	29	57	67
Lewis								
Harrisville	174	95	264	7	168	14	5	97
Livingston								
Livonia	243	45	219	75	151	43	91	50
Oneida								
Bridgewater	161	100	215	84	157	30	4	99
Waterville	176	92	233	51	162	22	14	93
Orange								
Highland Falls	167	97	224	69	192	3	- 25	103
Minisink Valley	221	56	228	57	176	9	44	77

Orleans								
Holley	190	79	216	82	143	57	47	74
Oswego								
Altmar-Parish	188	83	248	19	190	5	- 2	100
Otsego								
Edmeston	156	102	226	65	145	54	11	96
Gilbertsville	127	103	217	79	133	74	- 5	101
Rensselaer								
Schodack	212	67	206	96	101	94	111	37
St. Lawrence								
Clifton-Fine	317	22	262	8	121	84	196	19
Saratoga								
Corinth	213	65	212	89	154	38	59	65
Schoharie								
Schoharie	160	101	235	49	181	6	- 21	102
Steuben								
Troupsburg	110	104	225	66	150	44	- 41	104
Sullivan								
Eldred	426	11	224	70	95	96	330	11
Fallsburgh	290	27	256	11	153	41	136	30
Tompkins								
Lansing	367	15	166	103	80	98	287	15
Newfield	166	99	164	104	103	93	64	59
Ulster								
Saugerties	212	66	210	90	156	34	56	68
Warren								
Johnsburg	263	33	248	18	165	18	98	45
Washington								
Fort Ann	219	58	253	15	200	2	19	91
Putnam	309	24	257	10	74	99	235	18
Whitehall	189	80	242	27	156	33	33	84
Wayne								
Sodus	189	81	221	73	164	19	24	88
Wayne	216	60	197	100	138	66	78	56
Williamson	197	73	214	86	153	40	44	78

TABLE 7--Continued

County and district	(1) FC	Rank	(2) NEEDTOT	Rank	(3) NETTOT	Rank	(4) FCSC	Rank
Mean	244		234		143		101	
Standard deviation	130		27		30		148	
Total sample								
Mean	270		231		141		129	
Standard deviation	128		22		31		148	
New York City	309		583		434		-125	

[a]For definitions see glossary.

[b]Total non-school need (NEEDTOT) (column 2) minus non-school federal and state aid.

[c]Figures may not add due to rounding.

The non-education "needs" (NEEDTOT), as presented in Table 7, are more than twice as high in New York City[5] as the mean of the "needs" of any other district type; are next highest for the "Big Five" (large) cities; and are lowest for the suburbs of the "Big Five" cities (Upsub). The district classes New York City suburbs (Dnsub), small independent cities (IC), and other areas (Other) have total needs approximately equal to the mean for the total sample.

When total state and federal aid is netted out, in order to derive an estimate of total "needs" from local sources, given the existing amounts of aid, the rankings of groups of districts do not change. The New York City suburbs, the independent cities, and the other districts have approximately the average needs for local funds after state and federal aid are accounted for. The "Big Five" cities "need" more local funds than any class except New York City (which still "needs" more funds after aid than any other district class on average "needs" before aid), while the "Big Five" suburbs "need" much less money from local sources.

Once we have quantified non-education "needs" from local sources we can subtract these dollar amounts from local fiscal capacity for each district in order to determine the relative capacity of districts and types of districts to finance education after local non-education "needs"

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[5]It must be remembered that the New York City estimates are obtained by fitting New York City data into the equations estimated for a sample not containing New York City. Because of the fact that some New York City data points, such as density and density squared, fall far beyond the range of the data points used for estimating the coefficients, the New York City estimates are not reliable. They do, however, point to the fact that New York City does have "need" characteristics, as defined by our "need" variables, which in many cases are so immense as to dwarf the numbers obtained for other districts. Therefore, even though the New York City estimates are not reliable, they do, by their simple magnitude, tend to provide strong evidence of "needs" in New York City that are much greater than the "needs" of other districts.

have been provided for. In other words, we can subtract the local dollar amount needed to provide non-education public goods and services from the total local ability to raise governmental revenues (FC) in order to obtain local capacity remaining for education finance (FCSC). The results obtained by carrying out the above steps are listed in Table 7. It can be seen that local dollar capacity remaining for education finance (FCSC) varies from an average of $76 per capita in the small independent city districts to $254 in the downstate suburbs of New York City. From these numbers it can be inferred that combined state and federal non-education aid has not provided money to localities in such a manner as to equalize per capita funds remaining for education after non-education "needs" are financed.

Municipal Overburden

These data provide evidence that a condition which can be called "municipal overburden" does exist. In this case municipal overburden would be defined as the phenomenon of cities on the average having lower per capita fiscal capacity available for education after all other local public "needs" have been financed. But it also must be recognized that, based upon this analysis of <u>both</u> "needs" and "capacity," the smaller independent cities suffer from "municipal overburden" to a greater degree than do the larger "Big Five" cities. All of the city classes on the average have lower per capita fiscal capacity available for schools than do any of the three non-city classes, but the order of magnitude of "municipal overburden," based on this proxy measure, does not vary directly with city size. The analysis indicates that New York City is much worse off, in the sense of ability to finance education, with -$125 per capita

of available capacity; but it also shows that the smaller independent cities have a smaller per capita capacity to raise education dollars than do the larger "Big Five" cities. It is also noticeable that the Other class districts have average FCSC of only $4 more than that of the "Big Five." Also noteworthy is the fact that there are numerous districts with fiscal capacities very different from the average for the class in which they are included. Excluding New York City as a class, independent cities (IC) on the average have the lowest fiscal capacity available for education, and downstate suburbs the highest; yet the estimate for Binghamton (IC) is $131 per capita (32nd highest among the 104 districts), while that for Lindenhurst (Dnsub) is $50 (72nd rank). These two examples alone seem sufficient to make the point that generalizations about so-called "overburden" based upon averages for class types lead to erroneous conclusions for many individual districts. It would appear ridiculous to speak of "municipal overburden" in Binghamton and the absence of this same "overburden" phenomenon in Lindenhurst. Because not all cities are "overburdened" and not all non-cities are lacking in "overburden" perhaps the examination of non-education "needs" and fiscal capacity district-by-district is preferable to attempting to generalize about relative abilities of cities and non-cities to finance education after other "needs" are financed.

Need for Additional Aid

Perhaps a more fruitful approach to examination of school district ability to finance education would be to abandon the attempt to isolate education "needs" and capacity for financing them, from total "needs" and total fiscal capacity. Or simply stated, perhaps the relevant comparison

is of total (education and non-education) local "needs" and total local fiscal capacity. Subtraction of total "needs" from total capacity to raise revenues for financing these needs will provide information concerning the amount of surplus (or deficit) fiscal capacity existing in districts after all "needs" are financed. The districts whose local "needs" (given the existing amounts of state and federal aid) are greater than local fiscal capacity can be classified as needing additional aid, while those with an excess of fiscal capacity can be said to need less aid than is actually received. This implicit definition of "need for aid" assumes that aid should be distributed on the basis of an inverse relationship between aid and the excess of local fiscal capacity over local "needs" net of state and federal aid.

A "need for education" (NEEDED) equation analogous to our other "need" equations was derived, state and federal education aid were subtracted from the dollar amount of "education need," and the remainder (NETED) was subtracted from fiscal capacity available for schools (FCSC). The net result of this process was a number (designated as "SURPLUS") representing the positive or negative residual for each district that would result from taxation at 100 per cent of fiscal capacity and full provision of all local "needs" including education. Examination of "SURPLUS" provides information as to relative need of additional state and federal aid by the local units, using the criterion that additional aid should be inversely related to total local fiscal capacity net of total local "need."

The estimating equation for education "needs" (NEEDED) is as follows:

PSTPOP = -4.0622 - .2470 (FCSC) + .1259 (ACHU) + 100.7063 (ENPOP)
"t" values = (-2.1366) (9.6519) (2.8412) (17.3336)

R^2 = .7185

where

PSTPOP = per capita primary and secondary education current expenditures

FCSC = fiscal capacity available for education = (FC - NETTOT)

ACHU = percentage of underachieving pupils

ENPOP = public school enrollment as a percentage of population size[6]

Using this equation average fiscal capacity available for education is substituted for actual fiscal capacity available for education (FCSC) for all districts,[7] and the resulting "need" estimates are presented in Table 8. Also shown are "need for education" funds net of state and federal aid (NETED) and the residual (SURPLUS) resulting when total local education and non-education "needs" (NETTOT) are subtracted from total local fiscal capacity (FC).[8]

The types of districts end up in exactly the same order when ranked from highest average surplus (or highest ability to pay for all needed services) to lowest average surplus as they do when ranked from highest to lowest in average fiscal capacity available for education.

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[6]See glossary for more detailed definitions.

[7]The reason for this substitution is to normalize capacity as was accomplished in the other "need" equations by substituting average FC for actual FC in each district.

[8]SURPLUS is obtained by subtracting NETED from FCSC. This procedure produces the same results as subtracting total education and non-education local needs from FC.

TABLE 8

FISCAL CAPACITY AVAILABLE FOR SCHOOL EXPENDITURES AND NEED FOR AID PER CAPITA

County and district	(1) Fiscal capacity available for education (FCSC)[a] (dollars per capita)	Rank	(2) Needed education revenues (NEEDED) (dollars per capita)	Rank	(3) Net local need (NETED) (dollars per capita)	Rank	(4) Surplus (1)-(3) (SURPLUS)[b] (dollars per capita)	Rank
			"Big Five"					
Albany								
Albany	84	55	136	103	84	80	0	39
Erie								
Buffalo	13	95	197	81	112	47	- 99	102
Monroe								
Rochester	116	34	200	75	133	22	- 16	46
Onondaga								
Syracuse	102	42	187	87	110	52	- 8	43
Westchester								
Yonkers	170	23	177	93	119	38	50	22
Mean	97		179		112		- 15	
Standard deviation	57		26		18		54	
			Upstate suburbs					
Albany								
Cohoes	22	90	152	100	84	79	- 62	84
Green Island	90	52	167	95	109	55	- 19	51
Menands	585	4	98	104	95	66	490	3
Watervliet	23	89	163	96	97	63	- 73	87

Erie								
Grand Island	148	28	303	20	130	25	18	33
Kenmore	167	24	221	62	135	15	32	27
Lackawanna	437	6	216	65	154	6	283	6
Tonawanda	70	57	267	40	129	27	- 60	82
Monroe								
E. Rochester	115	35	141	100	135	20	- 19	50
Irondequoit-E. Irondequoit	101	44	203	73	107	58	- 6	42
Niagara								
N. Tonawanda	85	54	261	43	115	44	- 30	63
Onondaga								
Solvay	300	12	191	85	133	21	167	12
Rensselaer								
Rensselaer	92	48	209	68	116	42	- 24	56
Saratoga								
Waterford	52	71	155	99	68	92	- 17	47
Mean	163		196		115		48	
Standard deviation	166		56		24		159	

Downstate suburbs

Nassau								
Floral Park	175	21	198	79	106	59	69	19
Garden City	358	9	201	74	141	11	217	8
Glen Cove	104	41	227	59	143	10	- 39	69
Hempstead	162	25	178	92	124	33	38	26
Suffolk								
Babylon	90	51	213	66	111	49	- 21	52
Lindenhurst	50	72	441	1	160	5	-110	104
Shelter Island	634	2	141	101	85	77	549	2
Westchester								
Bronxville	602	3	210	67	151	7	452	4
Hastings-on-Hudson	172	22	239	54	124	32	47	23
Mount Vernon	136	31	204	71	135	19	2	37
New Rochelle	186	20	187	86	128	28	57	21

TABLE 8--Continued

County and district	(1) FCSC	Rank	(2) NEEDED	Rank	(3) NETED	Rank	(4) SURPLUS	Rank
Pelham	299	14	224	60	147	9	152	15
Pleasantville	248	16	284	31	179	3	70	18
Rye-Rye Neck	359	8	314	15	207	2	151	16
Somers	149	27	216	64	123	34	25	29
Tuckahoe	245	17	208	69	126	31	120	17
White Plains	349	10	198	78	123	35	227	7
Mean	254		228		136		118	
Standard deviation	166		70		28		169	
Independent cities								
Broome								
Binghamton	131	32	194	83	111	50	20	31
Vestal	141	29	326	8	137	13	4	36
Cattaraugus								
Olean	54	70	205	71	93	70	- 38	67
Chautauqua								
Jamestown	61	62	234	56	109	56	- 47	76
Chemung								
Elmira	55	69	309	17	135	17	- 80	92
Clinton								
Plattsburgh	62	60	179	90	90	72	- 28	62
Dutchess								
Poughkeepsie	112	36	200	76	117	41	- 5	41
Fulton								
Gloversville	17	92	207	70	83	82	- 66	86
Johnstown	45	75	269	37	92	71	- 46	74
Watertown	65	58	245	51	109	54	- 45	72
Montgomery								
Amsterdam	35	83	179	91	54	100	- 18	48

Niagara								
Lockport	107	40	239	53	129	26	- 22	53
Newfane	39	80	343	4	128	29	- 89	98
Niagara Falls	93	47	247	50	140	12	- 47	75
Oneida								
New Hartford	152	26	199	77	93	69	59	20
Utica	62	61	185	88	88	76	- 26	58
Otsego								
Oneonta	40	79	169	94	65	95	- 25	57
Schenectady								
Schenectady	58	66	197	80	110	53	- 51	79
Steuben								
Corning	92	49	294	22	115	45	- 23	55
Warren								
Glens Falls-Abraham Wing	88	53	241	52	111	51	- 23	54
Mean	76		233		105		- 30	
Standard deviation	37		52		23		33	

Other

Cattaraugus								
Randolph	28	86	291	26	47	102	- 19	49
Cayuga								
Moravia	14	94	311	16	96	65	- 82	93
Chautauqua								
Southwestern	32	85	316	14	123	36	- 91	100
Westfield	26	87	285	29	105	60	- 79	90
Delaware								
Andes	59	64	274	36	67	93	- 8	44
Dutchess								
Pawling	109	39	281	32	135	16	- 26	59
Essex								
Crown Point	36	82	293	24	70	91	- 34	65
Keene	299	13	253	46	112	48	187	11
Moriah	39	81	268	38	43	104	- 4	40

TABLE 8--Continued

County and district	(1) FCSC	Rank	(2) NEEDED	Rank	(3) NETED	Rank	(4) SURPLUS	Rank
Newcomb	519	5	318	13	126	30	393	5
Ticonderoga	109	38	255	45	108	57	1	38
Willsboro	117	33	278	35	89	73	28	28
Fulton								
Wheelerville	402	7	336	6	209	1	192	10
Genesee								
Elba	49	73	406	2	132	23	- 82	94
Greene								
Cairo	96	46	250	49	130	24	- 34	64
Durham	101	43	158	98	81	84	20	32
Herkimer								
Town of Webb-Inlet	743	1	261	42	177	4	566	1
Jefferson								
Alexandria	61	63	261	41	75	88	- 15	45
Hounsfield	4	98	305	19	89	74	- 85	95
Lyme	45	76	281	33	97	64	- 52	80
Thousand Islands	57	67	250	48	84	81	- 27	61
Lewis								
Harrisville	5	97	318	12	54	99	- 49	77
Livingston								
Livonia	91	50	292	25	135	14	- 44	71
Oneida								
Bridgewater	4	99	251	47	55	98	- 51	78
Waterville	14	93	309	18	94	68	- 80	91
Orange								
Highland Falls	- 25	103	138	102	61	96	- 86	96
Minisink Valley	44	77	234	57	83	83	- 38	68
Orleans								
Holley	47	74	237	55	81	85	- 34	66
Oswego								
Altmar-Parish	- 2	100	321	10	85	78	- 86	97

Otsego								
Edmeston	11	96	281	34	65	94	- 54	81
Gilbertsville	- 5	101	286	27	71	90	- 76	88
Rensselaer								
Schodack	111	37	231	58	72	89	39	25
St. Lawrence								
Clifton-Fine	196	19	337	5	150	8	46	24
Saratoga								
Corinth	59	65	295	21	104	62	- 45	73
Schoharie								
Schoharie	- 21	102	268	39	80	87	-101	103
Steuben								
Troupsburg	- 41	104	330	7	48	101	- 89	99
Sullivan								
Eldred	330	11	192	84	116	43	214	9
Fallsburgh	136	30	195	82	113	46	23	30
Tompkins								
Lansing	287	15	220	63	135	18	152	14
Newfield	64	59	284	30	47	103	17	34
Ulster								
Saugerties	56	68	260	44	119	39	- 63	85
Warren								
Johnsburg	98	45	322	9	89	75	9	35
Washington								
Fort Ann	19	91	184	89	59	97	- 40	70
Putnam	235	18	161	97	80	86	155	13
Whitehall	33	84	286	28	94	67	- 61	83
Wayne								
Sodus	24	88	319	11	118	40	- 93	101
Wayne	78	56	293	23	105	61	- 27	60
Williamson	44	78	346	3	122	37	- 79	89
Mean	101		273		96		4	
Standard deviation	148		52		34		128	

TABLE 8--Continued

County and district	(1) FCSC	Rank	(2) NEEDED	Rank	(3) NETED	Rank	(4) SURPLUS	Rank
Total sample								
Mean	129		243		107		22	
Standard deviation	148		62		32		134	
New York City	-125		128		70		-194	

[a]For definitions see glossary.

[b]Figures may not add due to rounding.

(See Table 9.) Downstate suburbs (suburbs of New York City) are still most able to locally provide for "needs" while (excluding New York City, which has a residual need for added funds [negative SURPLUS] which dwarfs the average need of any other type of district) the independent cities are least able to finance needed public services. The "Big Five" cities, along with the independent cities and New York City, are unable to finance all needed public services (including education) given their fiscal capacity (FC). The average district in each of the three other classes of districts is shown to be able to finance needed services with given fiscal capacity. But here too it must be emphasized that these generalizations do not hold for all individual districts. As can be seen in Table 8, there are districts of each type with positive surpluses as well as districts of each type with negative surpluses. Again, it can be stated that distribution of additional aid on the basis of type or size of district will be inefficient if aid to districts having total local "needs" in excess of total local fiscal capacity (FC) is the goal.[9]

Summary

While fiscal capacity (FC) alone is not a particularly useful index for measuring the ability of localities to finance one specific function such as education, it can be an extremely useful indicator if estimates of "need" for public services are also available. Subtracting "needs" net of aid for non-education purposes from fiscal capacity gives us an estimate of the local fiscal capacity available for financing

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[9]However, based upon variance analysis of "surplus" that results in an F value of 3.77 when districts are classified by type as opposed to .36 when the districts are grouped by size, it would be preferable to vary aid to districts on the basis of type rather than population size.

TABLE 9

MEANS OF NEED, ABILITY, AND EFFORT MEASURES FOR SCHOOL DISTRICT TYPES

	FC	NEEDTOT	NETTOT	EFFORT	FCSC	NEEDED	NETED	SURPLUS
New York City	309	583	434	112	-125	128	70	-194
"Big Five"	268	245	172	89	97	179	112	- 15
Upsub	287	218	124	88	163	196	115	48
Dnsub	392	229	138	108	254	228	136	118
IC	217	231	142	107	76	233	105	- 30
Other	244	234	143	100	101	273	96	4
Total sample	270	231	141	100	129	243	107	22

education (FCSC). Or, on the other hand, total "needs" including education net of aid can be subtracted from total fiscal capacity in order to determine the relative ability of districts to finance all public services. The results of this analysis can be worthwhile for evaluating the actual distribution of state and federal aid. If the areas with the low ability relative to "needs" do not get more aid than the areas with high fiscal capacity relative to "needs," it can be said that the aid system as it exists distributes aid less than optimally. Only an aid system which takes into account both local fiscal capacity and local "needs" can assure that the aid funds will go to those least able without aid to finance needed public services.

CHAPTER VII

SUMMARY AND CONCLUSIONS

In this thesis I have undertaken the task of developing a theoretically and empirically reasonable fiscal capacity index for school districts. Recognition was accorded the fact that fiscal capacity, or ability to raise public revenues, for school purposes is a meaningless concept unless the revenue raised for all other purposes from the same tax sources is considered. All that can be measured, in a realistic sense, is the total tax revenue capacity, for all public purposes, of the resources of a given geographic area.

Review of past attempts to measure fiscal capacity led to the conclusion that an ordinary least squares multivariate regression analysis, in which actual local governmental revenues collected (PLREV) is regressed upon median family income (MFI), and per capita full value of taxable property divided into five classes--residential (PRESID), commercial (PCOM), industrial (PINDUST), seasonal (PSEASON), and other property (POTHER), offers the best practicable method of measuring fiscal capacity of local units.

A sample of school district units in New York State was obtained--after much effort to match local governmental boundaries--and data were collected. The actual empirical analysis yielded results very similar to those expected, based upon hypothetical relationships.

An attempt was made using this fiscal capacity measure to estimate fiscal effort relative to fiscal capacity. A value judgment that

fiscal effort is not a useful measure upon which to base the amounts of state and/or federal aid to localities in the absence of a measure of "needed services" was the basis for the adoption of a method of estimating public "needs," which had been derived as a joint effort for a project for the State of New York.[1] The ability to estimate "needs" enables the fiscal capacity available for education, after all other "needs" are provided, to be estimated. This is a measure that is obviously of interest to educators, legislators, and others concerned with education finance. The ability to predict "needs" also allows total needs to be estimated and compared to total fiscal capacity. The results of this comparison--relative ability to finance "needed" local public services--should be of interest to anyone concerned with such topics as "municipal overburden," economic relationships of units of government in a federal system, and revenue sharing.

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[1]Harvey E. Brazer et al., Fiscal Needs and Resources: A Report to the New York State Commission on the Quality, Cost and Financing of Elementary and Secondary Education.

APPENDIX A

LOCAL GOVERNMENTS IN NEW YORK STATE AND SAMPLE SELECTION

Municipal Government

The present system of local government in the State of New York has evolved over a period of 300 years in response to a variety of political, economic, social, and demographic forces. As the size and geographical distribution of the State's population, the methods and speed of communication and transportation, and the types of services demanded from local government have changed, the structure and powers of local units have been modified in such a variety of ways that the present pattern of local government varies widely across the State and is extremely complex.

General local government services are provided through county, city, town, and village governments; additional public services are furnished by school districts, fire and other special districts. In some areas it is possible to have public services provided by as many as seven different kinds of governmental units, all independent of each other, with boundaries which need not be--and in most cases are not--coterminous. Furthermore, the same public services are provided by different levels and types of governmental units in different localities. In 1968 New York's system of local government included 8,806 separate local governmental units.

Although the analysis of the provision of public services in such a complex system of government is difficult, it can be facilitated by considering not the separate units but rather the total system of local government which provides the public services for a given area.[1] Using such a "systems approach," local government can be divided into five basic types, each with innumerable possibilities for local variation through the addition of special districts and public authorities. The five basic types of systems are: the totally integrated local government system (New York City), the integrated but overlapped city system, overlapped city with independent school district system, overlapped town with independent school district system, and the overlapped village with independent school district system.

The first type of local government system, the totally integrated government system, is unique to New York City. In the City all municipal functions, including education and those performed elsewhere by counties, are performed under a central administration so that there are no overlying or overlapping units of local government.[2] The City of New York is also unique by virtue of its size. New York City claims as residents 43 per cent of the State's population and an additional 20 per cent of the population resides in its SMSA area. It enrolls 33 per cent of the pupils enrolled in public schools, and has 43 per cent of the full valuation of real property.[3] The population of New York City is 17 times as large as

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[1]This approach to classifying local government is similar to one used by Seymour Sacks, Robert Harris, and John J. Carroll, The State and Local Government: The Role of State Aid, Comptroller's Studies in Local Finance, No. 3 (Albany: New York State Department of Audit and Control, 1963), pp. 32-40.

[2]There are, however, several independent public authorities.

[3]The sources of these data are U.S. Bureau of the Census, 1970 Census of Population, Final Population Counts, Advance Report, New York

that of the next largest city (Buffalo) and 5.5 times as large as the largest county outside of the City itself (Nassau). Because of the uniqueness of its size and government structure, New York City is considered separately throughout this study.[4]

The second kind of system of local government is that applicable to cities with over 125,000 population which have an overlying county government and an integrated fiscal system with a fiscally dependent school district coterminous with the city. Buffalo, Rochester, Syracuse, Yonkers, and Albany have this type of government system.[5] In fiscal 1967-68 these "Big Five" cities contained 7 per cent of the population of the State, 6.3 per cent of the full valuation of taxable real property, and enrolled 5.8 per cent of the pupils enrolled in public schools.[6]

State, PC(VI)-34 (January, 1971) and 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.).

[4]To attempt to include New York City data in our analysis on the same basis as other municipalities would be extremely difficult because much of the analysis is done by the method of ordinary least squares regression analysis, and many New York City data points are of such magnitude as to be completely outside the range of all other data points. For this same reason when we estimate values for New York City using our coefficients obtained through regression analysis we cannot be confident of correctness of the magnitude of the estimates.

[5]Because its population has dropped below 125,000 in the 1970 Census, the City of Albany will no longer have this type of system but will have an independent school district as do the cities with less than 125,000 population.

[6]Percentages based on data in U.S. Bureau of the Censu, 1970 Census of Population; State of New York, Department of Audit and Control, Division of Municipal Affairs, Special Report on Municipal Affairs by the State Comptroller, Transmitted to the Legislature March 18, 1969 (Albany: March 18, 1969); and The University of the State of New York, The State Education Department, Information Center on Education, Annual Education Summary.

The third type of local government system is the city with an independent school district. In these cities public services are provided by three levels of government: the county, the city itself, and the independent school district. However, there are a number of variations of this system, such as cities served by more than one school district and cities whose school districts include areas outside the city limits.[7]

A fourth type of local government system is the unincorporated area within a town. This type of system is overlapped by county government and contains special districts and fiscally independent school districts, which may or may not be coterminous with the town. Within this type of system there is room for a great deal of variation in makeup. In rural areas where there are no incorporated villages or special districts the government system may be quite simple. In urban towns surrounding the Big Six cities, however, an incredibly complex system of overlapping governments and special districts may evolve.

When all or part of a town is incorporated as a village, a fifth type of local government system applies. Such areas have a county government, town government, village government, and a fiscally independent school district which may or may not be coterminous with the village. In urban counties, the parts of towns incorporated as villages often differ from the surrounding unincorporated areas only in having a general purpose government for providing services provided by special districts in the unincorporated areas of the town. In some urban villages and in villages

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[7] In only 12 of the 56 cities with this system of local government is the school district coterminous with the city. For example, the City of Rye is served by two school districts and, at the other extreme, the Corning City District includes the City of Corning and all or part of twelve surrounding towns.

in rural areas the incorporated area may differ in character from the surrounding areas by providing a much wider range of public services.[8]

These last four kinds of systems of local government have overlying and independent county governments. The State is divided into 62 counties, including the five counties which comprise the City of New York. Public service programs provided by county governments include public health, mental health, social services, highways and bridges, parks, community colleges, libraries, airports, civil defense, courts, law enforcement, and jails. The largest item in the county budgets is for social service programs which alone account for 53 per cent of county operating expenditures. Because a large share of local public services is provided through county governments in many but not all counties in the State, a study of local government expenditures must include expenditures by county governments. The expenditures of county governments in the fiscal year ending in 1968 account for 28 per cent of current local governmental expenditures excluding New York City and 14 per cent of current expenditures of all local governments. The county government's share of current expenditures by all local government units in individual counties varies from a low of 14 per cent in Broome County to a high of 39 per cent in Greene County. In rural parts of the State, where only a few areas have incorporated as cities or villages, the county normally assumes a proportionately larger role. In urbanized areas, the importance of county government depends primarily on whether social service programs are operated by the county or by smaller social service districts. Broome County, where the City of Binghamton and the Town of Union operate their

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[8]See Sacks, Harris, and Carroll, State and Local Government, pp. 36-37.

own social service districts, is a good example of an urban county where the county-government plays only a small role in the system of local government.[9]

Outside of cities, special districts and fire districts may be important providers of public services. Special districts are administrative units, usually of a county or town, established to provide specific services or specific improvements. Because they lack the powers of general governments, they are not considered true local units of government. Normally special districts are established to provide such services as sewage disposal, drainage, water supply, street lighting, public parking, refuse and garbage collection, and parks and public docks to the population of all or part of a town. Special districts are established upon petition by the approval of the State Comptroller's office and once established enable the administering town, village, or county government to provide services to residents and property owners in a certain area and to levy taxes and assessments on those who benefit from the services.

A school district area may contain several different special districts, each of which serves only part or all of the district; parts or all of one or more villages; parts or all of one or more towns; parts of one or more counties; parts or all of one or more cities; and the school district itself. Unless a high degree of coterminality exists between the school district and the other local jurisdictions the allocation of tax revenues and expenditure from other units to school districts can prove almost impossible.

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[9]Percentages in this paragraph and following paragraphs are based on data in State of New York, Department of Audit and Control, Division of Municipal Affairs, Special Report on Municipal Affairs, March 18, 1969.

School Districts

With the passage of the Laws of 1812, chapter 242, the State Legislature acted to set up a state-wide system of common school districts. The towns of the State were to be divided by the town school commissioners "into a convenient and suitable number of" school districts.[10] By the 1850's the State's system of schools consisted of nearly 12,000 common school districts, and efforts were made to begin consolidating and centralizing school districts. By the 1967-68 school year these efforts had reduced the number of school districts to 849 including 89 non-operating districts.

Five kinds of school districts operate in the State of New York. The common school district, the oldest and simplest kind of school district, can provide only elementary education. Common districts are governed by a single trustee or a board of trustees. The legislative power of the district, with certain exceptions, is exercised by qualified voters at annual or special district meetings. Even though common districts do not have the right to operate their own high schools, they are responsible for providing secondary education by designating the high schools of one or more other districts for the attendance of their resident high school pupils. Although they once constituted the whole of

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[10]Laws of 1812, chapter 242, as cited in The University of the State of New York, The State Education Department, Division of Law, School District Reorganization, Law Pamphlet 14 (Albany: 1962), p. 8. Other information on school district organization is taken from Lynton K. Caldwell, The Government and Administration of New York (New York: Thomas Y. Crowell Company, 1954); Robert Rienow, New York State and Local Government, 2nd rev. ed. (Albany: University of the State of New York, The State Department of Education, 1959); and Irving M. Cowle, School Aid in New York State (New York: Teachers College Press, Teachers College, Columbia University, 1968).

the State's education system only 37 common school districts are currently operating.

Union free school districts, first authorized in 1853, are combinations of two or more common school districts with the power to establish and maintain a high school. The executive powers of a union free district are vested with a school board of from three to nine members. Legislative power resides directly with voters of the districts except when the voters have failed or refused to appropriate sufficient funds to obey the constitutional mandate to keep the schools open. When this occurs the board of education has the power to appropriate the necessary funds for teachers' salaries and items known as "ordinary contingent expenses" which are required to operate the public schools on a minimum basis. A union free district having more than 4,500 inhabitants and meeting certain other requirements may be authorized to appoint its own superintendent of schools, in which case it is referred to as a village superintendency or an independent union free school district. Because of several drawbacks in the 1853 law only a relatively small number of union free districts was formed and as of 1967-68 there were 167 union free districts, of which 74 had become independent union free districts. Most of these districts are in the New York City SMSA.

Central school districts were established in 1914 to be formed out of common, union free, and other central school districts in order to make possible a broader reorganization program than was possible under the Union Free School District Act. As in the case of union free districts, central districts can operace their own high school, are governed by a school board, and have legislative powers vested in voters present and voting at annual or special school district meetings or elections.

A central district granted the power to appoint its own superintendent is frequently called a "village superintendency" or an independent central district.

The central high school district was established in 1917 to allow several common or union free districts to combine solely for the purpose of establishing and operating a high school. The component districts remain in existence and continue to operate the elementary schools. The district is governed by a board of education made up of representatives from the boards of education of the constituent districts. There are only four such districts presently in existence in the State.

The statutory basis for the fifth kind of school district, the city district, was established in 1917. In the original City School Law, which still substantially governs the operations of the Big Six cities, the school district is fiscally dependent in that the budget prepared by the board of education is turned over to the city government which determines the amount of the city tax levy to be devoted to school purposes. The city may increase, decrease, or approve the total amount devoted to schools but may not change individual items in the budget. Several attempts have been made to provide for the fiscal independence of the school districts in the Big Six cities, but this would require a constitutional amendment and thus far all such attempts have been unsuccessful.

In 1949 the constitution was amended allowing the City School Law to be revised in 1950 to provide separate tax and debt limits and fiscal independence for school districts in cities of less than 125,000 population. Such city districts are governed by a board of education of five, seven, or nine members. The voters have limited powers as they are basically able to vote only on the election of board members (except in

the eight city districts which have appointive boards), on an increase in the constitutional tax limit for their districts, and on certain bond issues. Within the tax limits set by the constitution and the voters, the tax rate is set by the board of education.

Constitutional Tax Limits

Since the constitutional limits on property tax rates may significantly affect the ability of a community to raise revenue it is important to understand the basic elements of the existing tax limit structure.[11] The basic elements of the tax structure are shown in Table A-1. The tax limit is applicable only to property taxes levied for general municipal "operating" purposes and does not apply to non-property taxes or to property taxes levied for capital outlays, assessments on only part of a municipality, and most types of debt service. The exemption of principal and interest payments on bonds has caused some municipalities to turn more to debt finance than they would have done otherwise in order to escape the impact of these tax limits.

The limits are defined as a percentage of the average of the full valuation of taxable real property over the previous five years. The effect is to make the tax limits more severe in a growing community and to slow the fall of tax limits in a declining community.

Tax margins, or the difference between what is actually levied and what is permitted under the constitution, are the smallest in the State's largest cities. In fiscal year 1967 the cities of Rochester,

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[11] For a more detailed analysis and history see State of New York, Department of Audit and Control, Tax Limits of Counties, Cities and Villages, 1963-1967, Comptroller's Studies for the 1967 Constitutional Convention, Study No. 1 (Albany: October, 1966).

TABLE A-1

CONSTITUTIONAL TAX LIMITS OF LOCAL GOVERNMENTS IN NEW YORK STATE

Taxing jurisdiction	Percentage of 5-year average full valuation of taxable real estate				
	Tax limit	Overlapping county limit	Overlapping school limit	Overlapping town limit	Total of tax limits
New York City	2.5	--	--	--	2.5
5 other cities of 125,000 or more	2.0	1.5-2.0	--	--	3.5-4.0
56 cities of less than 125,000	2.0	1.5-2.0	1.25-2.0	--	4.75-6.0
554 villages	2.0	1.5-2.0	No limit	No limit	No limit
928 towns	No limit	1.5-2.0	No limit	No limit	No limit

Source: New York State Temporary Commission on the Constitutional Convention, "Local Finance," Report No. 3, 1967, p. 47, as adapted by ACIR, Measuring Fiscal Capacity and Effort, p. 84.

Syracuse, Yonkers, and New York had essentially taxed up to their constitutional limit under the property tax.

The presence of tax limits and the fact that over the century in which they have been in effect their primary impact has been on cities are probably important factors related to much of the thinking on "municipal overburden." The "municipal overburden" hypothesis as developed by John Polley states that "the pressure of need for services generated in urban areas causes an unequal portion of the tax base to be occupied by municipal government levies in various municipalities. This means that those communities which must provide the greatest amount of municipal service do not have access to the full tax base for educational purposes."[12] There is no obvious reason why a city or other municipality should not support both a high level of municipal public services and a high level of educational expenditures, if the voters of that municipality prefer to devote their incomes and resources to public services rather than the consumption of private goods. However, where there are constitutional limits placed on tax rates for public services, as is the case in the Big Six cities, then once these limits are reached, higher expenditures on municipal services must be matched by equal reductions in education expenditures, or vice versa. This may be a valid meaning for the concept of "municipal overburden."

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[12]John W. Polley, "Variations in Impact of Municipal Government on Ability to Support Schools," in A New Approach to School Finance: 1961 Review of Fiscal Policy for Public Education in New York State, Staff Studies (Albany: New York State Educational Conference Board, September 1, 1961), p. 22.

The Sample

The focus of this study is on the fiscal behavior and characteristics of units of local government in New York State. In order to draw useful conclusions about the behavior of local governments, the appropriate units for analysis are the individual decision-making units--the municipalities and school districts. Moreover, since the same local public services are provided by different kinds and levels of local government in different areas of the State the unit of analysis should include all of the units of local government (counties, cities, towns, villages, and school districts) and special districts which provide public services in a given area, that is, the complete system of local government for the area. Unless all such governmental units are included in the unit of observation, valid comparisons cannot be made between one area and another.

Unfortunately, however, as pointed out in the discussion of local government in New York State, the various units of government providing services in a given area need not have coterminous boundaries. Given the objectives of this study, this presents something of a dilemma.

An approach frequently used in previous studies of expenditures of local governments in New York State is to aggregate the expenditure of all municipal governments and special districts within each county. The unit of analysis is then the system of governments operating in a county.[13] In some ways this approach provides an easy solution to the dilemma as it greatly simplifies the problems of data collection and substantially

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[13]See, for example, Sacks, Harris, and Carroll, State and Local Government, or Hogan, Measurement of Ability.

resolves the problem of non-coterminality.[14] However, when data are aggregated to the county level the identity of the individual decision-making unit is lost and with it the information about the behavior of the individual units. Aggregation at the county level means that municipalities of various types, sizes, and social, economic, and fiscal characteristics are lumped together as one unit. To use the county as the unit of analysis is to assume that the behavior and characteristics of the individual units within the county are the same as the "average" unit. This assumption is a strong one as it implies that the behavior of rich and poor, residential communities and industrial enclaves, is the same. This assumption appears to be a highly unrealistic one. Because the focus of this study should be on the behavior of individual units of government, and because this behavior is lost by aggregating to the county level, the county level approach was rejected. The choice has to be made of studying some unit of local jurisdiction such as cities or counties and attempting to fit school district and other local unit data to the city, town, village, or county data or of studying school districts and fitting other local data to the school districts.

Of the actually usable types of units in the sense of being geographic areas comprised of comparable units of government that include the whole state--counties, or school districts--the school districts are actually non-aggregated governmental decision-making jurisdictions. For this reason the decision was made to use school district areas as units and to allocate data from other types of units to the various school districts.

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[14] Even when data are aggregated to the county level, some problems of non-coterminality remain as some villages and school districts cross county boundaries.

Clearly we cannot study all 848 school districts, some of which overlap the boundaries of as many as twelve overlying local governments, and, at the same time, the 24 coterminous school districts offer a sample that is both too small and too unrepresentative.[15]

The sample of 24 school districts exactly coterminous with the boundaries of a municipal government was increased to a sample of 104 districts. The sample districts and some important characteristics are shown in Table A-2. The additional 80 districts were selected by means of a process of examining school district maps overlaid on maps showing the boundaries of counties, cities, towns, and villages. The school districts chosen are those which, in our judgment, are sufficiently close to being coterminous with the boundaries of the overlying municipal governments to allow the relevant data for the municipal jurisdictions to serve as an approximation to the data applicable to the school district. Since all of the data are used on a per capita basis, and population is derived by totaling over the same jurisdictions and fractions of jurisdictions, discrepancies caused by the small non-coterminalities should be minor. If, for instance, the total property value is 1/10 too large so should the population figure be approximately 1/10 too large.

The resulting sample of 104 school districts and their overlying system of municipal government cannot be considered a strictly "random" sample. Therefore a number of tests have been applied to the sample to insure that it is sufficiently representative of all districts in the State from the viewpoint of the research objectives of the study.

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[15] During the 1967-68 school and fiscal year only 24 school districts had boundaries coterminous with those of a city, town, or village.

TABLE A-2

CHARACTERISTICS OF THE SAMPLE DISTRICTS, 1967-68

County and district	Full value of taxable property (PUTPROP)[a] (dollars per WADA)	Total local tax rate (TOTXRATE)[a] (dollars per 1,000)	Operating expenditures per WADA (PSTW)[a] (dollars)	Pupils (WADA)[a]	Estimated 1968 population (POP)[a]	Median family income (MFI),[a] 1959 (dollars)
			"Big Five"			
Albany						
Albany	50,167	38	1,188	11,922	117,844	5,778
Erie						
Buffalo	25,243	55	904	72,204	476,766	5,713
Monroe						
Rochester	38,325	49	1,152	44,003	300,709	6,361
Onondaga						
Syracuse	32,604	52	936	30,058	200,974	6,247
Westchester						
Yonkers	41,950	41	993	29,797	201,623	7,471
Mean	37,658	47	1,035	37,597	259,583	6,314
Standard deviation	9,421	7	128	22,448	137,608	706
			Upstate suburbs			
Albany						
Cohoes	22,986	57	894	2,282	18,916	5,573
Green Island	35,958	43	1,025	410	3,344	6,161
Menands	159,853	35	1,187	301	3,153	8,250
Watervliet	19,976	45	729	1,716	12,707	5,901
Erie						
Grand Island	17,532	59	964	3,778	13,119	7,972
Kenmore	34,653	37	824	22,690	106,832	7,648

Lackawanna	70,072	35	1,072	5,748	28,838	6,058
Tonawanda	17,551	54	904	5,482	21,831	6,746
Monroe						
E. Rochester	42,961	31	1,002	2,171	10,850	7,470
Irondequoit-E. Irondequoit[b]	29,797	35	1,112	12,321	62,007	8,572
Niagara						
N. Tonawanda	16,926	56	911	9,072	35,994	6,554
Onondaga						
Solvay	50,272	40	975	2,176	11,727	6,597
Rensselaer						
Rensselaer	21,881	47	773	1,840	10,210	5,590
Saratoga						
Waterford	27,939	36	1,058	1,128	7,493	6,149
Mean	40,597	44	959	5,080	25,226	6,803
Standard deviation	37,450	10	130	6,124	28,082	1,002
Downstate suburbs						
Nassau						
Floral Park[c]	44,861	32	1,204	3,879	19,777	8,532
Garden City	59,551	51	1,343	5,124	25,088	13,875
Glen Cove	37,317	44	1,198	5,280	25,379	6,510
Hempstead	54,962	53	1,378	5,263	38,523	7,455
Suffolk						
Babylon	30,393	47	1,160	2,579	12,855	7,642
Lindenhurst	10,796	63	1,036	10,989	25,790	6,705
Shelter Island	143,558	24	1,652	254	1,578	4,914
Westchester						
Bronxville	60,658	47	1,535	1,463	6,688	19,876
Hastings-on-Hudson	30,107	55	1,242	2,205	9,379	9,030
Mount Vernon	35,402	49	1,161	11,848	73,424	6,873
New Rochelle	42,555	49	1,237	12,470	75,670	8,131
Pelham	43,190	42	1,255	3,163	13,827	10,820
Pleasantville	35,326	48	1,198	1,778	6,810	8,470

TABLE A-2--Continued

County and district	PUTPROP	TOTXRATE	PSTW	WADA	POP	MFI
Rye-Rye Neck[b]	36,138	48	1,229	4,847	15,540	11,205
Somers	38,651	32	1,236	1,724	8,615	7,351
Tuckahoe	59,681	40	1,485	1,133	6,237	6,731
White Plains	57,995	42	1,474	8,895	50,273	8,012
Mean	48,302	45	1,296	4,876	24,438	8,949
Standard deviation	27,891	9	160	3,898	22,635	3,511
Independent cities						
Broome						
Binghamton	26,056	77	874	12,350	66,487	6,251
Vestal	15,764	48	912	8,057	25,021	7,430
Cattaraugus						
Olean	20,201	49	1,003	4,152	21,251	5,636
Chautauqua						
Jamestown	18,114	70	824	8,857	40,200	5,607
Chemung						
Elmira	14,359	63	912	14,223	47,900	5,767
Clinton						
Plattsburgh	23,950	57	1,013	2,982	19,006	5,616
Dutchess						
Poughkeepsie	28,882	55	1,034	5,762	33,289	5,893
Fulton						
Gloversville	15,636	53	906	3,969	20,090	5,432
Johnstown	12,803	54	910	2,665	10,114	5,660
Watertown	16,737	59	992	7,071	31,291	5,480
Montgomery						
Amsterdam	19,582	50	1,124	5,448	34,150	5,477
Niagara						
Lockport	23,099	65	934	6,747	31,552	6,645

Newfane	11,780	54	962	2,926	9,097	6,341
Niagara Falls	21,669	64	976	19,038	88,971	6,630
Oneida						
New Hartford	28,511	28	909	4,241	20,833	7,630
Utica	24,799	54	951	14,745	93,371	5,873
Otsego						
Oneonta	20,101	51	1,148	3,392	20,356	5,436
Schenectady						
Schenectady	24,619	55	1,136	12,713	78,624	5,925
Steuben						
Corning	18,254	42	958	9,497	34,030	6,540
Warren						
Glens Falls-Abraham Wing[b]	22,382	55	1,025	4,030	17,494	5,744
Mean	20,365	55	975	7,643	37,156	6,051
Standard deviation	4,968	10	87	4,719	25,261	642
			Other			
Cattaraugus						
Randolph	9,797	59	1,049	1,508	5,165	5,332
Cayuga						
Moravia	13,071	40	890	1,554	5,314	4,789
Chautauqua						
Southwestern	12,171	52	935	3,028	9,713	6,078
Westfield	18,250	39	889	1,514	5,260	5,508
Delaware						
Andes	24,766	33	1,108	316	1,206	4,262
Dutchess						
Pawling	24,359	41	1,106	1,198	4,599	6,290
Essex						
Crown Point	9,902	73	1,039	499	1,823	4,893
Keene	35,524	62	1,491	174	756	4,185
Moriah	13,471	56	1,080	1,363	5,363	4,639
Newcomb	23,035	103	1,674	332	1,003	5,902

TABLE A-2--Continued

County and district	PUTPROP	TOTXRATE	PSTW	WADA	POP	MFI
Ticonderoga	18,154	50	872	1,447	5,795	6,064
Willsboro	19,387	47	900	614	2,308	4,535
Fulton						
Wheelerville	41,950	43	1,051	250	771	6,495
Genesee						
Elba	11,671	38	858	935	2,302	5,447
Greene						
Cairo	24,721	52	949	846	3,402	4,839
Durham	45,099	42	986	246	1,583	4,148
Herkimer						
Town of Webb-Inlet[b]	67,642	45	1,512	505	1,896	5,122
Jefferson						
Alexandria	18,826	53	1,018	893	3,527	5,007
Hounsfield	11,010	43	880	818	2,761	5,212
Lyme	19,762	49	1,011	418	1,530	4,558
Thousand Islands	20,076	41	801	1,517	5,717	5,137
Lewis						
Harrisville	8,440	66	917	708	2,262	4,257
Livingston						
Livonia	19,214	36	811	1,854	6,419	5,889
Oneida						
Bridgewater	11,151	50	964	282	1,194	5,714
Waterville	11,149	42	845	1,341	4,514	5,525
Orange						
Highland Falls	16,675	33	1,054	1,415	13,522	6,301
Minisink Valley	24,964	26	1,049	1,863	8,881	5,169
Orleans						
Holley	16,823	36	882	1,495	6,371	5,968
Oswego						
Altmar-Parish	11,312	54	1,036	1,493	5,056	4,771

Otsego						
Edmeston	12,520	36	938	676	2,519	4,320
Gilbertsville	12,503	36	921	410	1,417	3,938
Rensselaer						
Schodack	16,469	44	1,030	1,393	6,323	6,000
St. Lawrence						
Clifton-Fine	22,888	47	1,000	1,195	3,602	5,925
Saratoga						
Corinth	14,992	43	933	1,656	5,659	5,641
Schoharie						
Schoharie	11,921	36	860	1,481	5,619	4,805
Steuben						
Troupsburg	6,417	72	901	330	1,018	4,179
Sullivan						
Eldred	51,234	34	916	450	2,212	4,494
Fallsburgh	36,005	61	1,373	1,349	7,717	5,885
Tompkins						
Lansing	51,194	34	1,122	1,235	5,622	6,185
Newfield	11,941	56	1,026	884	3,151	5,397
Ulster						
Saugerties	17,307	35	839	4,030	16,290	6,031
Warren						
Johnsburg	12,794	58	923	765	2,352	4,505
Washington						
Fort Ann	18,891	37	996	622	3,624	5,400
Putnam	76,959	41	2,804	66	561	4,201
Whitehall	13,461	44	869	1,531	5,458	4,910
Wayne						
Sodus	15,559	37	989	2,243	8,321	4,930
Wayne	21,495	33	990	2,639	9,887	6,158
Williamson	15,195	44	1,020	1,828	6,144	5,567
Mean	21,711	47	1,044	1,150	4,531	5,207
Standard deviation	14,985	14	314	783	3,300	703

TABLE A-2--Continued

County and district	PUTPROP	TOTXRATE	PSTW	WADA	POP	MFI
Total sample						
Mean	29,107	48	1,060	5,289	29,107	6,249
Standard deviation	23,043	12	255	9,530	62,574	2,030
New York City	44,331	59	1,202	1,023,888	7,850,605	6,371

[a]For definitions and sources of data see glossary.

[b]Two separate districts treated as one. Webb-Inlet districts since merged.

[c]All data presented for Floral Park include an estimate of the area's share of Hempstead 2 (Sewanhaka) central high school district. Expenditures and revenues are apportioned on the basis of its share of local tax revenues for the high school; students (WADA) are apportioned according to its share of common school (K-6) WADA in the component districts.

Relevant features of the sample school districts are presented in Table A-3 for comparison to all districts in the State and its subregions.[16] Inspection of the table indicates that the full value of real property and expenditure per pupil in weighted average daily attendance are reasonably close to their levels for all districts in the State, and for the three main areas of the State. To the extent that there are differences between sample districts and all districts, the differences are fairly uniform throughout the sample. For the sample as a whole and for each of the main areas of the State the sample means for the full value of taxable property are higher than the mean for all districts. For the suburban districts in the New York City SMSA school district expenditures per pupil in weighted average daily attendance in the sample are slightly below those for all districts when Yonkers is included. For the New York City SMSA suburbs excluding Yonkers expenditures are slightly

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[16]Means in Table A-3 are calculated as the expenditures and full value of real property for the State or subregion divided by the total weighted average daily attendance for the State or subregion whereas in other tables in this study means are calculated as the mean of the individual districts' per pupil or per capita values. This means that this table is not directly comparable with other tables. In this table a large district has a proportionately large effect on the mean, whereas in other tables each district is given the same weighting. For comparison of the sample with all districts the use of the weighted means is more appropriate. The differences between the two types of means are potentially the greatest where the number of districts is small or one district is large relative to the total. This is true for the "Big Five" where there are only five districts and Buffalo, with its lower per pupil expenditures, accounts for 46 per cent of the weighted average daily attendance. In Table A-3 the areas of the State are divided according to their SMSA status for the 1960 Census. Since some of the districts in the SMSA area are still essentially rural in nature and not all SMSA districts are suburbs of the Big Six cities, we have developed our own classification of districts to be used in the actual research of this report, which is similar to the SMSA classification but more suited to our research objectives. For a discussion of some of the problems of the SMSA classifications in New York State see Harold Herman, New York State and the Metropolitan Problem (Philadelphia: University of Pennsylvania Press, 1963), pp. 35-42.

TABLE A-3

COMPARISON OF THE SAMPLE WITH ALL SCHOOL DISTRICTS IN THE STATE

Taxable property and education expenditures by SMSA status

		Number of districts	Weighted average daily attendance (WADA)	Education expenditures (dollars)	Full value of real property per WADA)
State		849	3,278,796	1,104	32,287
New York City		1	1,023,888	1,202	44,331
State less New	Actual	848	2,254,908	1,060	26,819
York City	Sample	109	549,906	1,016	30,504
"Big Five" cities		5	187,984	999	35,371
Upstate SMSA	Actual	186	805,258	983	25,218
	Sample	34	316,789	977	30,799
Upstate SMSA less	Actual	182	647,071	979	23,090
"Big Four"	Sample	30	158,602	954	27,683
Non-SMSA	Actual	385	624,534	986	19,358
	Sample	55	120,471	966	19,739
New York City	Actual	188	825,116	1,192	34,028
SMSA	Sample	20	112,646	1,177	41,189
New York City	Actual	187	795,319	1,198	33,690
SMSA less	Sample	19	82,849	1,243	40,516
Yonkers					

Kinds of districts

	State	Sample	Sample ratio
City	62	33[a]	1/2
Village superintendency	192	23	1/8
Central	372	44	1/8
Central high school	4	1	1/4
Union free	93	5	1/19
Common	37	3	1/12
Non-operating	89	0	--
	849	109[b]	

[a]Thirty-four including New York City.

[b]Two districts in each of four and one central high school district serving a common school district.

higher than for all districts. This is the largest difference between all districts and the sample and yet is a difference of only 3.7 per cent.

The proportions of the State excluding the Big Six cities represented in the sample are roughly similar for each area of the State except that the New York City suburbs may be slightly underrepresented. In the New York City SMSA it is extremely difficult to find districts sufficiently coterminous with overlying municipal governments to be included in the sample.

The fact that per pupil expenditures for the whole sample are low is probably due largely to the underrepresentation of the New York City suburbs. In general, however, we are satisfied that differences between our sample, the State, and the regions of the State are small enough to permit us to draw conclusions from sample data with some confidence.

Data on the distribution of districts by population size and proportions of property of different types is shown in Table A-4. The section of the table showing the distribution of the sample by population size indicates that the sample includes a number of districts in each size class and that in each of the areas of the State most of the size classes found in that area are represented.

The table on the number of districts by proportion of property in the main property classes suggests that the sample contains districts with a wide range of proportions by types of property. Seven districts with at least 40 per cent of their full value in industrial property might be classed as industrial districts.[17] Eight districts are highly

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[17] The seven are Lackawanna, Clifton-Fine, Lansing, Green Island, Moriah, Corinth, and Rensselaer.

TABLE A-4

DISTRIBUTION OF DISTRICTS

Size of municipality by SMSA status

Municipality size (estimated 1968 Census population)	Upstate SMSA		Non-SMSA		New York City SMSA		All sample districts
	City	Village and town	City	Village and town	City	Village and town	
	(number of districts)						
Less than 10,000	0	10	0	40	0	6	56
10,000-24,999	4	4	6	2	1	3	20
25,000-49,999	3	1	6	0	1	3	14
50,000-99,999	4	1	0	0	3	0	8
100,000 and above	4	1	0	0	1	0	6
	15	17	12	42	6	12	104

Proportion of property classes

Percentage of property type of total full value	Type of property				
	Residential (PRESID)	Commercial (PCOM)	Industrial (PINDUST)	Seasonal (PSEASON)	Other (POTHER)
	(number of districts)				
0- 4.99	0	8	15	76	71
5- 9.99	1	41	25	6	24
10-19.99	3	32	36	7	9
20-29.99	5	15	15	5	0
30-39.99	7	4	6	4	0
40-49.99	16	2	2	3	0
50-59.99	22	1	3	2	0
60-69.99	21	0	1	1	0
70 and above	29	1	1	0	0

commercial in that at least 30 per cent of their full value of property is commercial.[18] Although many of the sample districts contain at least some seasonal property, six having at least 35 per cent of their full value of property as seasonal property could be classed as resort areas.[19] Since New York State does contain many districts which could be classified as industrial, commercial, residential, and resort a representative sample should also contain districts of each of these types.

In cases where school district boundaries are not coterminous with municipality boundaries one possible explanation for the lack of coterminality is that the boundary of either the municipality or school district was drawn to include or exclude some large industrial facility, shopping center, or other commercial establishment. Such a property could significantly affect the ability of a school district to finance public services including schools. In order to insure against the possibility that such a large property would not be accounted for because our procedures ignore very small pieces of non-school district jurisdictions included in or excluded from our districts, a questionnaire was sent to the school districts to check on the location of large properties. The districts were requested to send a list of properties with an assessed value greater than $100,000.

The results of the questionnaires were checked against the detailed municipal property value data obtained from the State Board of Equalization and Assessment and the data on the value of property taxable

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[18]The eight commercial districts are Newcomb, Menands, White Plains, Hempstead Village, Yonkers, Poughkeepsie, Mount Vernon, and Floral Park.

[19]The six resort areas are Caroga, Webb-Inlet, Putnam, Fallsburgh, Shelter Island, Lyme, Keene, and Alexandria.

for schools obtained from the State Department of Education in order to account for all property in the school district. If our total property values for the school district obtained from the summation of data from the detailed breakdowns available for non-school district jurisdictions were not extremely close to the full value of total property obtained from the State Department of Education we used the data from the questionnaires to determine the approximate percentages of this unexplained property belonging under the various property types. If the discrepancies were large and the information obtained by use of the questionnaires did not explain most of the unexplained value, the district was removed from the sample.

APPENDIX B

GLOSSARY

1. ACHU = underachieving pupils - the percentage of pupils taking achievement tests in the fall of 1967 who failed to achieve a score indicating minimum competence. Minimum competence is defined by the State Education Department as a raw score exceeding the scores of 23 per cent of the pupils in the 1966 norm population. Data obtained from the State Education Department.

2. ADCPOP = ADC children - number of ADC children used in E.S.E.A. Title I allocations, January, 1968, as a percentage of estimated 1968 population. Number of ADC children from The University of the State of New York, The State Education Department, Division of Educational Finance, Report of 1968-69 Allocations to New York State Local Educational Agencies Under Title I of the Elementary and Secondary Education Act (Albany: January, 1969).

3. AF[a] = farm properties, with buildings, on which farm operations have ceased. Buildings must constitute one-fourth or more of the value of the property.

4. AGED = aged population - percentage of population 65 and over in 1960. State of New York, Department of Commerce, Business Fact Book, 1963; Part 2: Population and Housing (Albany: 1963).

5. APT[a] = apartments (four or more dwelling units).

6. AREA = area - land area in square miles in State of New York, Department of Audit and Control, Division of Municipal Affairs, Special Report on Municipal Affairs by the State Comptroller, Transmitted to the Legislature March 18, 1969 (Albany: March 18, 1969).

7. ATTEND = attendance rate - average daily attendance as a percentage of enrollment in public schools. The University of the State of New York, 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.).

8. BUS = business property proportion - commercial and industrial property as a percentage of total property value.

9. CAREA = county area - land area of county in square miles. State of New York, Department of Audit and Control, Division of Municipal Affairs, Special Report on Municipal Affairs by the State Comptroller,

Transmitted to the Legislature March 18, 1969 (Albany: March 18, 1969).

10. CDENSITY = county population density - estimated 1968 population per square mile in 100's of persons. See county population size (CPOP) and county area (CAREA) for sources.

11. CHILD = child population - percentage of population 14 years and younger in 1969. State of New York, Department of Commerce, Business Fact Book, 1963; Part 2: Population and Housing (Albany: 1963).

12. COM = commercial property proportion - commercial property as a percentage of total property value.

13. COMB[a] = buildings with both rental stores and apartments located in residential areas.

14. COMM[a] = business properties used primarily for retail stores, combination stores, and dwelling units in business districts.

15. CPOP = county population size - estimated 1968 population obtained by taking a weighted average of 1960 and 1970 populations with 1960 weighted .20 and 1970 weighted .80. U.S. Bureau of the Census, 1970 Census of Population, Final Population Counts, Advance Report, New York State, PC(VI)-34 (January, 1971).

16. CRIME = crime rate - expected number of crimes reported in 1967 and 1968 in categories included in crime index. U.S. Department of Justice, Federal Bureau of Investigation, Crime in the United States, Uniform Crime Reports for the United States (Washington, D.C.: U.S. Government Printing Office, 1967 and 1968).

17. CURBAN = county urbanization - percentage of county population in urban areas in 1960, calculated as number of persons in urban areas in 1960 divided by 1960 county population. State of New York, Department of Commerce, Business Fact Book, 1963; Part 2: Population and Housing (Albany: 1963).

18. DENSITY = population density - estimated 1968 Census population per square mile in 100's. Calculated as population size divided by area divided by 100. See area (AREA) and population size (POP).

19. DENSQ = population density squared. See population density (DENSITY).

20. EFFORT = actual local revenue divided by estimated fiscal capacity times 100.

21. ENPOP = public school enrollment rate - public school enrollment as a percentage of population size. See public school enrollment (ENROLL) and population size (POP).

22. ENROLL = public school enrollment - enrollment in public schools in the 1967-68 school year in kindergarten through the 12th grade and

special education programs. The University of the State of New York, 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.).

23. EST[a] = estates, properties primarily for residence located on five or more acres of land.

24. FC = fiscal capacity per capita - per capita total revenues that would be expected to be raised by all local governments serving a school district area given the area's median family income, real property value, and its distribution among residential, commercial, industrial, seasonal, and other types of property, and actual statewide norms of fiscal capacity.

25. FCPP = fiscal capacity per pupil = $FC \times \frac{POP}{WADA}$.

26. FCSC = fiscal capacity available for education = (FC - NETTOT).

27. FOR[a] = privately owned forest lands; must be one acre or larger.

28. GAP = per capita estimated residual revenues of a school district area taxing at 100 per cent of fiscal capacity (FC) after all estimated "needs" have been paid for = (FCSC - NETED).

29. IND[a] = industrial properties.

30. IVA[a] = vacant lots in urban commercial or industrial areas.

31. MF[a] = muck farms, one acre or more, comprised of soil of the "muck" type.

32. MFI = median family income, 1959 - median family income derived as a weighted (by population) average of the median family incomes of each unit included within the school district. U.S. Census of Population, 1960, as published in State of New York, Department of Commerce, Business Fact Book, 1963; Part 2: Population and Housing (Albany: 1963).

33. MFR[a] = two- or three-family residences.

34. NONHS = adults not completing high school - percentage of persons 25 years and over not completing high school. State of New York, Department of Commerce, Business Fact Book, 1963; Part 2: Population and Housing (Albany: 1963).

35. NONWH = non-white population - non-white persons as a percentage of population in 1960. Calculated as non-white persons divided by 1960 population size times 100. State of New York, Department of Commerce, Business Fact Book, 1963; Part 2: Population and Housing (Albany: 1963).

36. OF[a] = operating farms, 10 acres or more, used primarily for agricultural purposes.

37. OIL[a] = oil wells.

38. OLDH = old housing - percentage of housing units in 1960 built in 1939 or earlier. State of New York, Department of Commerce, Business Fact Book, 1963; Part 2: Population and Housing (Albany: 1963).

39. OTHCOM = all private commercial properties fitting into none of the other New York State classification categories (ex. = golf course, airport, hospital, theatre, etc.).

40. PCOM[a] = commercial property per capita (full value) = (COMM + APT + COMB + OTHCOM)/POP.

41. PINDUST[a] = industrial property per capita (full value) = (IVA + IND + UT + RRNC + OIL)/POP.

42. PLREV = per capita actual total local revenues raised - per capita governmental revenues raised by all local governments serving a school district area (county, city, town, village, special district, and school district) by means of taxes, license fees, and franchise fees.

43. POP = population size - estimated 1968 Census population calculated as a weighted average of 1960 and 1970 populations with a weight of .20 for 1960 and .80 for 1970. U.S. Bureau of the Census, 1970 Census of Population, Final Population Counts, Advance Report, New York State, PC(VI)-34 (January, 1971).

44. POP60 = 1960 population size - 1960 Census population. See population size (POP).

45. POP70 = 1970 population size - 1970 Census population. See population size (POP).

46. POPGRO = population growth - estimated 1968 population divided by 1960 population. See population size (POP).

47. POTHER[a] = miscellaneous property per capita (full value) = (RUVA + FOR + SPEC)/POP.

48. PRESID[a] = residential property per capita (full value) = (AF + RSVA + SFR + MFR + OF + MF + EST)/POP.

49. PSEASON = seasonal property per capita (full value) = (RST + SR)/POP.

50. PSTW = operating expenditures per WADA - total General and Federal Aid Fund operating expenditures per pupil in weighted average daily attendance.

51. PUTPROP = full value of taxable property - state equalized value of property taxable for school purposes divided by the number of pupils (WADA) in the district.

52. RESID = residential property proportion = full value of residential property as a percentage of the full value of total taxable property.

53. RRNC[a] = railroad taxable property.

54. RST[a] = seasonal resorts.

55. RSVA[a] = vacant land in residential areas.

56. RUVA[a] = abandoned rural land not devoted to agriculture or forests.

57. SEASON = seasonal property proportion - the full value of seasonal property as a percentage of the full value of total taxable property.

58. SFR[a] = single family residences.

59. SIZE = population size. See population size (POP).

60. SPEC[a] = special franchises. Public utility corporations' property located in streets and other public places and assessed by the State at the same rate to full value as locally assessed property.

61. SR[a] = seasonal residences.

62. TOTXRATE = total local tax rate - total local revenues from property taxes, non-property taxes, and other revenues as a percentage of full value of property taxable for schools.

63. UT[a] = all public utility property, except special franchises (SPEC).

64. WADA = pupils in weighted average daily attendance - weights are those used for school aid purposes in New York State: 0.5 for kindergarten pupils; 1.0 for pupils in grades one through six; and 1.25 for those in grades seven through twelve.

65. WNONHS = adults not completing high school in welfare district - see adults not completing high school (NONHS).

66. WYL4 = low income families in welfare district - percentage of families in welfare district in 1960 with 1959 incomes under $4,000. See low income families (YL4).

67. YL4 = low income families - percentage of families in 1960 with 1959 incomes under $4,000. State of New York, Department of Commerce, Business Fact Book, 1963; Part 2: Population and Housing (Albany: 1963).

[a]All property value data except those for villages were obtained directly from the New York State Office for Local Government, Division of Equalization and Assessment, in the form of a magnetic computer tape entitled 1965 Market Value by Property Type for Cities and Towns. The property values of each type for all units included within the school district were summed to obtain total full property values of each type. Fractions of property values for units were used where only a fraction of the unit was included in a district. These fractions were obtained by subtracting the full value of all wholly contained units from total full value in the school district, then determining what fraction the remainder of school district property was of the partially contained unit. Our districts were chosen such that fractions of more than one unit never had to be used. Where the district was wholly contained within but not coterminous with a town, the town's portion of the property was allocated to the school district, based upon the fraction of total town full value contained within the school district.

For villages only assessed property value data were available for certain minor classes of property. These were the types of property which were not sampled in the most recent state-wide property assessment sample. In the village data the major proportion of total full value for each village is accounted for by sampled types of property. The problem is to adjust to full value the assessed values of the remaining, less important in dollar-value terms, classes of property. We subtracted the full value accounted for by sampled types of property from total full value taxable for schools as recorded in State of New York, Department of Audit and Control, Division of Municipal Affairs, Special Report on Municipal Affairs by the State Comptroller, Transmitted to the Legislature March 18, 1969 (Albany: March 18, 1969). An assessment ratio for the non-sampled types of property was then obtained by dividing total assessed value of the non-sampled classes by the remaining unexplained full value. All of the non-sampled types were then divided by the assessment ratio and the resulting estimated full values of these property types were used in our analysis.

APPENDIX C

COEFFICIENTS OF SIMPLE CORRELATION, FISCAL CAPACITY ESTIMATING EQUATION

		1 PLREV	2 MFI	3 PRESID	4 PCOM	5 PINDUST	6 PSEASON	7 POTHER
1.	PLREV							
2.	MFI	.445						
3.	PRESID	.466	.715					
4.	PCOM	.611	.461	.325				
5.	PINDUST	.233	-.039	-.079	.054			
6.	PSEASON	.478	-.185	.085	-.029	-.022		
7.	POTHER	.615	-.166	.102	.150	.003	.776	
8.	SIZE	-.039	.068	-.057	.095	.010	-.150	-.105

APPENDIX D

LEVELS AND RANKS OF ACTUAL REVENUES RAISED BY LOCAL GOVERNMENTS AND ESTIMATES OF FISCAL CAPACITY BASED UPON REPRESENTATIVES OF THE MAJOR ALTERNATIVE METHODS

County and district	Actual local revenue (PLREV) (dollars per capita)	Rank	Median family income (MFI) (dollars)	Rank	Property value per capita (PTPROP) (dollars)	Rank	Fiscal capacity estimated by regression of PLREV upon MFI and PTPROP (REGRESS)	Rank	Estimated fiscal capacity (FC) (dollars per capita)	Rank
"Big Five"										
Albany										
Albany	192	70	5,778	55	5,075	49	238	48	255	37
Erie										
Buffalo	209	62	5,713	59	3,823	76	198	77	215	61
Monroe										
Rochester	276	37	6,361	32	5,608	38	261	39	285	28
Onondaga										
Syracuse	253	45	6,247	37	4,876	53	237	51	259	35
Westchester										
Yonkers	257	44	7,471	16	6,200	31	291	28	329	21
Mean	237		6,314		5,116		245		268	
Standard deviation	36		706		887		34		42	
Upstate suburbs										
Albany										
Cohoes	157	88	5,573	66	2,773	98	164	99	179	89
Green Island	190	72	6,161	39	4,409	61	221	60	240	48
Menands	531	8	8,250	9	15,260	3	584	4	625	4

Watervliet	121	100	5,901	50	2,698	100	165	97	191	76
Erie										
Grand Island	298	28	7,972	12	5,049	50	259	40	266	32
Kenmore	275	38	7,648	13	7,360	24	329	22	306	26
Lackawanna	485	10	6,058	44	13,967	4	522	6	488	7
Tonawanda	239	52	6,746	22	4,407	62	227	57	223	54
Monroe										
E. Rochester	264	42	7,470	17	5,490	40	268	35	238	50
Irondequoit-E. Irondequoit	210	61	8,572	6	5,921	34	293	27	261	34
Niagara										
N. Tonawanda	240	51	6,554	28	4,266	65	221	62	217	59
Onondaga										
Solvay	375	19	6,597	27	9,328	14	381	16	351	19
Rensselaer										
Rensselaer	185	76	5,590	65	3,943	74	201	76	221	55
Saratoga										
Waterford	150	92	6,149	41	4,206	67	215	66	214	63
Mean	266		6,803		6,363		289		287	
Standard deviation	125		1,002		3,906		127		125	
				Downstate suburbs						
Nassau										
Floral Park	280	35	8,532	7	8,799	17	383	15	352	18
Garden City	623	3	13,875	2	12,163	7	542	5	499	6
Glen Cove	345	25	6,510	30	7,764	19	331	21	280	29
Hempstead	402	15	7,455	18	7,509	23	332	20	353	17
Suffolk										
Babylon	288	32	7,642	14	6,098	33	289	29	250	42
Lindenhurst	291	31	6,705	24	4,600	58	233	55	186	85
Shelter Island	555	6	4,914	85	23,108	1	799	1	697	2
Westchester										
Bronxville	622	4	19,876	1	13,269	6	637	3	695	3
Hastings-on-Hudson	389	16	9,030	5	7,078	25	334	19	307	25

APPENDIX D--Continued

County and district	PLREV	Rank	MFI	Rank	PTPROP	Rank	REGRESS	Rank	FC	Rank
Mount Vernon	281	34	6,873	21	5,713	37	269	34	314	23
New Rochelle	346	24	8,131	10	7,013	26	323	23	340	20
Pelham	417	14	10,820	4	9,880	13	440	9	420	12
Pleasantville	447	11	8,470	8	9,223	15	396	13	362	16
Rye-Rye Neck	536	7	11,205	3	11,272	8	488	8	479	9
Somers	251	47	7,351	20	7,735	20	338	18	269	31
Tuckahoe	438	12	6,731	23	10,841	10	430	11	373	14
White Plains	428	13	8,012	11	10,261	12	424	12	485	8
Mean	408		8,949		9,548		411		392	
Standard deviation	119		3,511		4,218		143		142	
Independent cities										
Broome										
Binghamton	371	21	6,251	36	4,840	54	236	53	248	44
Vestal	244	48	7,430	19	5,076	48	255	41	253	39
Cattaraugus										
Olean	195	69	5,636	62	3,947	73	201	74	204	69
Chautauqua										
Jamestown	279	36	5,607	64	3,991	70	203	72	193	74
Chemung										
Elmira	269	40	5,767	56	4,264	66	213	67	215	62
Clinton										
Plattsburgh	216	57	5,616	63	3,758	82	195	79	190	77
Dutchess										
Poughkeepsie	274	39	5,893	51	4,999	51	237	50	252	40
Fulton										
Gloversville	165	84	5,432	74	3,089	96	172	94	167	97
Johnstown	181	77	5,660	60	3,373	86	184	84	199	71
Watertown	221	54	5,480	70	3,782	80	195	81	202	70

Montgomery										
Amsterdam	158	87	5,477	71	3,124	95	174	92	175	93
Niagara										
Lockport	320	27	6,645	25	4,939	52	243	44	249	43
Newfane	203	64	6,341	33	3,789	79	203	70	189	82
Niagara Falls	296	29	6,630	26	4,637	57	233	54	240	49
Oneida										
New Hartford	161	85	7,630	15	5,804	35	280	32	273	30
Utica	211	60	5,873	54	3,916	75	203	71	219	57
Otsego										
Oneonta	171	81	5,436	73	3,349	89	181	85	179	90
Schenectady										
Schenectady	220	55	5,925	48	3,981	71	205	68	227	53
Steuben										
Corning	215	58	6,540	29	5,094	47	247	43	240	47
Warren										
Glens Falls-Abraham Wing	282	33	5,744	57	5,156	46	241	46	231	52
Mean	233		6,051		4,245		240		217	
Standard deviation	58		642		774		97		30	
				Other						
Cattaraugus										
Randolph	168	82	5,332	78	2,860	97	164	98	192	75
Cayuga										
Moravia	154	89	4,789	90	3,822	77	189	82	172	96
Chautauqua										
Southwestern	199	66	6,078	42	3,794	78	201	75	184	86
Westfield	204	63	5,508	69	5,253	43	241	45	199	72
Delaware										
Andes	212	59	4,262	98	6,489	28	268	36	191	78
Dutchess										
Pawling	257	43	6,290	35	6,345	29	284	30	255	38

APPENDIX D--Continued

County and district	PLREV	Rank	MFI	Rank	PTPROP	Rank	REGRESS	Rank	FC	Rank
Essex										
Crown Point	198	68	4,893	87	2,710	99	155	101	177	91
Keene	511	9	4,185	101	8,176	18	321	24	419	13
Moriah	192	70	4,639	92	3,424	85	175	90	184	88
Newcomb	786	2	5,902	49	7,625	21	320	25	615	5
Ticonderoga	224	53	6,064	43	4,533	59	224	59	242	46
Willsboro	242	50	4,535	94	5,158	45	229	56	257	36
Fulton										
Wheelerville	586	5	6,495	31	13,602	5	515	7	464	10
Genesee										
Elba	179	79	5,447	72	4,740	56	225	58	184	87
Greene										
Cairo	322	26	4,839	88	6,148	32	263	38	251	41
Durham	292	30	4,148	103	7,008	27	283	31	234	51
Herkimer										
Town of Webb-Inlet	807	1	5,122	82	18,017	2	640	2	864	1
Jefferson										
Alexandria	252	46	5,007	83	4,766	55	221	61	211	68
Hounsfield	139	95	5,212	79	3,262	92	176	89	174	94
Lyme	266	41	4,558	93	5,399	41	237	52	188	83
Thousand Islands	218	56	5,137	81	5,327	42	240	47	214	64
Lewis										
Harrisville	174	80	4,257	99	2,642	101	147	102	174	95
Livingston										
Livonia	198	67	5,889	52	5,550	39	255	42	243	45
Oneida										
Bridgewater	132	98	5,714	58	2,634	102	161	100	161	100
Waterville	139	95	5,525	68	3,312	91	180	86	176	92
Orange										
Highland Falls	58	104	6,301	34	1,745	104	139	103	167	97
Minisink Valley	135	97	5,169	80	5,237	44	238	49	221	56

Orleans										
Holley	144	94	5,968	47	3,948	72	205	69	190	79
Oswego										
Altmar-Parish	180	78	4,771	91	3,340	90	174	93	188	83
Otsego										
Edmeston	120	102	4,320	97	3,360	87	170	95	156	102
Gilbertsville	129	99	3,938	104	3,618	84	174	91	127	103
Rensselaer										
Schodack	158	86	6,000	46	3,628	83	195	80	212	67
St. Lawrence										
Clifton-Fine	357	23	5,357	77	7,593	22	314	26	317	22
Saratoga										
Corinth	188	74	5,641	61	4,387	63	215	65	213	65
Schoharie										
Schoharie	114	103	4,805	89	3,142	94	168	96	160	101
Steuben										
Troupsburg	149	93	4,179	102	2,080	103	128	104	110	104
Sullivan										
Eldred	360	22	4,494	96	10,423	11	395	14	426	11
Fallsburgh	384	17	5,885	53	6,294	30	278	32	290	27
Tompkins										
Lansing	381	18	6,185	38	11,246	9	437	10	367	15
Newfield	189	73	5,397	76	3,350	88	180	86	166	99
Ulster										
Saugerties	151	91	6,031	45	4,282	64	216	64	212	66
Warren										
Johnsburg	242	49	4,505	95	4,161	69	197	78	263	33
Washington										
Fort Ann	121	100	5,400	75	3,242	93	177	88	219	58
Putnam	374	20	4,201	100	9,054	16	348	17	309	24
Whitehall	166	83	4,910	86	3,776	81	189	83	189	80
Wayne										
Sodus	154	90	4,930	84	4,194	68	202	73	189	81
Wayne	187	75	6,158	40	5,737	36	263	37	216	60
Williamson	199	65	5,567	67	4,521	60	219	63	197	73

APPENDIX D--Continued

County and district	PLREV	Rank	MFI	Rank	PTPROP	Rank	REGRESS	Rank	FC	Rank
Mean	244		5,207		5,312		215		244	
Standard deviation	155		703		3,042		30		130	
Total sample										
Mean	270		6,249		5,931		270		270	
Standard deviation	141		2,030		3,464		119		128	
New York City	346		6,371		5,782				309	

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