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ABSTRACT

The study reported in this document found no evidence for the minicipal overburden (m/o) hypothesis of urban school finance. The theory asserts that there is a causal relationship between high levels of non-school municipal expenditure or tax rates and low levels of school spending. Demand for expenditure on education in a sample of school districts in Connecticut, New Jersey, and Virginia was estimated using a median voter model and the hypothesis was tested by including in the estimating equation several versions of a variable representing municipal overburden. The following conclusions are reported: (1) m/o does not influence the demand for expenditure on education are demand for municipal services and demand for education are influenced by much the same factors, so that where the demand for one is high the demand for the other is also likely to be high; (3) demand for education behaves similarly to demand for any other good in that the quantity demanded responds positively to income and negatively to price, with elasticities that are within the expected range for a good that absorbs an appreciable fraction of income, for which quantity can be varied, and for which there are substitutes; (4) proxies for preferences also play expected roles; (5) federal and state aid influence demand for education in ways that are not satisfactorily explained by either the income-constraint expanding role or the "flypaper" mode; and (6) none of the forces often alleged to lead "inexorably" to high expenditures for municipal functions is found to do so. Two tables of statistical data are included. A discussion of the methodology used to estimate the demand for municipal services, details of the regressions used as tests of the municipal overburden hypothesis, and a list of five references are appended. (FMW)

MUNICIPAL OVERBURDEN: ITS INFLUENCE ON EDUCATION EXPENDITURES IN CITIES

by

Harvey E. Brazer
and
Therese A. McCarty

Department of Economics
The University of Michigan
Ann Arbor, Michigan 48109

Abstract

The municipal overburden hypothesis asserts the existence of a causal relationship between high levels of non-school municipal expenditure or tax rates and low levels of school spending. We estimate demand for expenditure on education using a median voter model. The hypothesis is tested by including in the estimating equation several versions of a variable representing municipal overburden. We find no evidence in support of the hypothesis.

MUNICIPAL OVERBURDEN: ITS INFLUENCE ON EDUCATION EXPENDITURES IN CITIES[1]

The concept of "municipal overburden" is a response to concern that large cities cannot adequately finance their schools. It suggests an inverse causal relationship between levels of non-school municipal expenditure or tax rates and levels of school spending.

The municipal overburden ("m/o") argument has two premises: first, that cities have characteristics such as high population density, aged housing stock, and large concentrations of low income, unemployed, aged, and minority populations that lead inexorably to high levels of spending for municipal services; and second, that there is a fixed fund from which both school and municipal services must be financed. It then follows that spending on education in large cities is relatively low because of unavoidably high levels of spending on municipal services.

The m/o hypothesis has been invoked in challenges to the constitutionality of state systems of school finance in New Jersey, New York, and Maryland. Our review of the relevant cases leaves us with the impression that the concept has gained something close to general acceptance in New Jersey, at least considerable respect in New York, and has not been rejected in Maryland. It appears to be established as a legitimate cause of action in suits challenging the constitutionality of state-local systems of financing schools.[2]

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[1] The authors are indebted to several colleagues for a number of important insights. We are particularly grateful to T. C. Bergstrom, Roger Gordon, Saul H. Hymans, and Judith Roberts. This study was made possible by a grant from the National Institute of Education, which is in no way responsible for its contents.

[2] M/o has only been explicitly recognized by the legislature of one state, Michigan, where districts whose non-school tax rate exceeds 125 per cent of the statewide average receive supplementary school aid. Several other states adjust state aid for high populat n density, low income, or large numbers of children living in poverty. These adjustments may in some cases reflect concern about

Debate in these cases has not been served by adequate empirical evidence or economic analysis. Our objective is to provide them.

The Demand for Education

The Choice Model

To test the validity of the m/o hypothesis, we need to determine whether or not the requirements of financing municipal services systematically affect the level of education expenditure. In other words, if m/o exists, then we should be able to show that it affects the demand for education.

We adopt the median voter model as a description of the process by which a community chooses the quantity and mix of local public goods that it wishes to consume. In particular, we assume that the median voter, or the voter with median income, age, education, property value owned, and so forth, is the decisive voter. We expect that the quantity of education supplied in each school district will equal the median quantity demanded in that district.[3]

In our model the median voter is a rational actor whose behavior is designed to maximize his utility, given his preference function, the prices he faces, and his income. Not only does he always vote, but his votes are cast in such a way as to be consistent with his utility maximizing behavior over all goods, public and private.

Assuming that there are only two public goods, municipal and education expenditures, and one composite private good, and that the median voter has a

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(cont'd) m/o.

[3]For more on the median voter model see Bergstrom and Goodman (1973).

log-linear demand function for each good, we estimate a demand function of the form:

$$\ln ED = \ln A + \alpha \ln P_e + \beta \ln P_m + \gamma \ln Y + \Sigma \delta_i \ln Z_i + \varepsilon$$

where P_e is the price of education, P_m is the price of other local public goods, Y is median income, Z is a vector of community characteristics that are thought to influence the median voter's decisions, and ε is a random error term with mean of zero.

Education is both a private and a social good, and for the individual it is both a consumption and an investment good. Being so difficult to define, it is impossible to measure in terms of physical units. We proceed by using "dollars per pupil of expenditure on current account" as our proxy for the quantity of units of educational output. This approach requires a rather bold assumption, that a one dollar purchase of inputs to the educational process produces equal quantities of output everywhere. Also, in dividing expenditure by enrollment, we assume that the number of pupils is not influenced by expenditure.[4]

Defining Tax Price

A local public good does not have a price in the usual sense. Instead, we presume that the median voter is cognizant of a "tax price, which is the cost to him in additional tax paid of an increase of one dollar in the level of expenditure per pupil (or per capita in the case of municipal services). Tax price is a function of the median voter's "tax share," which is the ratio of the value of his tax base to the community's tax base. It is also affected by the presence of state or federal matching aid, and by deductibility of property taxes for those who itemize deductions on their federal and state income tax returns. Thus

$$P_e = (H_m/V)(1 - m)(1 - mtr)(n),$$

where H_m is the median house value in the community, V is the taxable value of

[4]On issues regarding the nature of education as a commodity, see Stiglitz (1974).

all property, m is the matching rate under state aid for local schools, mtr is the median voter's marginal state and federal income tax rate, and n is the number of pupils enrolled in the district.

The ratio of the assessed value of the median value house(H_m) to the total assessed valuation of property subject to tax in the community(V) is the median voter's property tax share. We assume that the median voter pays the same proportion of all other local taxes levied as well. This may be justified given the further assumption that the value of housing occupied is a monotonic function of income. Tax share will vary from one community to another with the number of households, the value of non-residential property, and the percentage of housing that is owner-occupied.[5]

Underlying our definition of tax share are the assumptions that the homeowning median voter behaves as though he believes that all taxes paid by business and industry are borne elsewhere and that his tax share is independent of the level of expenditures or the tax rate. In our model it is irrelevant who actually bears taxes paid by business as long as the median voter believes that he does not and behaves accordingly. It is of interest, and comforting, to note that the most recently published estimate of the extent to which non-residential property taxes are shifted outside of the taxing jurisdiction concludes that "....there is no statistically significant evidence that less than 100% of such taxes are perceived as exported."[6]

That tax share is independent of tax rate or expenditure level turns on the assumption that land use patterns are insensitive to tax rates; and specifically that businesses do not move in or out in response to tax changes. In this case

[5]This assumes that the distribution function for the taxable value of residences is everywhere the same. If, as seems likely, it is not, then tax share will be a function in part of the skewness of income distribution and, therefore, that of the distribution of house values. As the ratio between the mean and median values increases, tax share declines.

[6]Greene and Munley (1984), p. 125.

convincing empirical evidence has yet to appear.

The matching rate (m) under general purpose state aid is the ratio of the increment in state aid that accompanies a one dollar increase in local expenditures for education.[7]

Tax price is further reduced by any share of school taxes absorbed by federal and state governments through deductibility of property taxes for income tax purposes. We assume that the median voter with household income greater than $20,000 itemizes deductions.[8] Given the substantial variance within each of our three observation states in median family income, the deductibility of property taxes under the federal and some state income taxes will appreciably affect the variance in tax price.

Other Determinants of Demand

We have not been able to devise a measure for the price of private goods, or one for local non-school public goods that is sufficiently different from tax price for education. Only the difference in matching rates under grants contributes at all to the difference between the latter two prices, and in the case of municipal grants, after much searching we were unable to identify clearly any matching grants.

Our income variable (Y) is median family income for 1979 as reported in the 1980 Census.

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[7] Where the matching applies to locally financed expenditures, m enters the calculation of tax price in the term (1/1 + m); if it applies to total expenditure, including the state share, m enters in the term (1 − m). In either form we are concerned with entering the expression that reduces the tax price to the local taxpayer by the appropriate amount. Thus, for example, if m is .5 and applies to total expenditure, state aid has the effect of reducing tax price by half. But if it applies to locally funded expenditure only, then it reduces tax price by one third.

[8] Our median voter is likely to be part of a married couple filing a joint return, and well over half of those with incomes of $20,000 or more in 1979 who filed jointly itemized deductions. Furthermore, as a homeowner the probability is high that he will pay interest on a mortgage and property taxes which, together with charitable contributions and other state-local taxes, will exceed the "zero bracket amount" of $3,400 on a joint return.

The median voter's income relative to that of other residents in his community may affect the amount he pays for local public services. Income distributions are generally skewed in such a way that a community's median income is less than the mean. If benefits from expenditure are distributed equally among residents, then the greater the skewness of income distribution the lower is the effective tax price paid by the median voter for local services. To capture the effect of skewness on the demand for public goods we would need data on the distribution of income that is not readily available. Attempts have been made to use the ratio of median to mean income as a measure of skewness of the income distribution, but it does not provide us with any information that we are not already getting from our tax price variable.

Lump-sum aid to education affects the median voter by, in effect, extending his budget constraint.[9] We account for the share of this aid implicitly received by the median voter by multiplying the total amount received under lump-sum grants by his tax share. Each lump-sum grant may be viewed as an increase in the median voter's income equal to the amount by which the taxes he pays could be reduced without cutting expenditures below the level that would have obtained in the absence of the grant.

The median voter in each community does not function in a vacuum. Rather, he is subject to a variety of influences that may be grouped under the general head of "community characteristics." They include such factors as the proportion of the population that is over age 64(AGED), the incidence of poverty(POVT), and the proportion of the adult population that has never finished high school(NOHS). The proportion of the population that voted Democratic in the last Presidential election (VOTE) and the proportion of residences that are owner occupied (OOC)

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[9]Minimum aid in Connecticut and New Jersey, and most general aid in Virginia, as well as Federal and state categorical aid are lump sum. Basic (general) aid is matched in New Jersey, but it is the previous year's expenditures that are subject to matching. Thus we believe that state aid does not directly influence the current year's perceived tax price of education, and we therefore treat it as lump sum aid.

are viewed as proxies for preferences of voters for local public goods. We expect that older people, owner occupants, the poor, and those with less than a high school education prefer lower outlays for education and that they will influence preferences of the median voter accordingly. Democrats, on the other hand, traditionally the more liberal public spenders, are seen as a positive influence on expenditures for education.

The amounts that are spent for education per pupil are likely also to be influenced by some aspects of the schools themselves. Secondary pupils are generally more costly to educate than those in elementary school, so we include the proportion of pupils who are in secondary school(SECPUP).

A high rate of enrollment growth(ENRGR) is expected to be associated with lower expenditures per pupil because of the lag involved in increasing resource inputs in the face of rapid growth.

The influence of the fraction of pupils who are enrolled in private and parochial schools(PRIV) is ambiguous, as is that of the number of pupils per family(PUPFM). On the one hand a larger private school enrollment increases the potential resource base for those who attend the public schools, but on the other hand it drains private funds in the payment of tuition and removes many parents who are most supportive of education from the population of public school parents.

The larger the number of pupils per family the greater is the burden of any given level of per pupil expenditure. We should expect, therefore, that as the number of pupils per family increases, other things equal, expenditures per pupil will decline. But the larger the number of pupils in the median voter's family the larger is his stake in the local schools and the higher the level of expenditure he may be expected to support.

Another characteristic of the school district that we expect to play a role in determining levels of expenditure is its size measured by its enrollment(PUP). It is our hypothesis that the influence of size is quadratic in form; that is, as the number of pupils increases from very low levels expenditures tend to decrease, other things constant, until an optimal size is reached, beyond which diseconomies of scale are encountered. To account for this quadratic form, we also enter enrollment squared(PUPSQ).

In Connecticut and New Jersey pupils are frequently sent to school in districts other than the one in which they live(SENT) and, by the same token, many districts educate children who are not residents(NONRS). We expect these variables to be inversely related to expenditure per resident pupil.[10]

Two other characteristics of the school district are likely to be of importance in New Jersey. The first is its membership in a regional district that provides secondary schooling for its resident children. We expect that school districts that are members of regional high school districts(MEMB) will generally spend less (other things equal) than those that are not.[11] We also consider whether the school district functions as an independent political entity or as part of a municipal government(DEPDIST). It has been argued that the dependent district, being able to take advantage of log rolling among interest groups, is likely to spend more, other things equal, than the independent district.[12]

The Influence of Municipal Overburden

To test for the influence of m/o on the demand for education we will successively enter several measures of m/o into our demand equation. We have

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[10] Our dependent variable is expenditure net of tuition received and transportation expenditure, divided by the number of resident pupils.

[11] We included members of regional high school districts only in New Jersey, because there our sample would otherwise have been unacceptably small. We exclude regional districts in general because it is hard to make sense of their expenditure decisions in the framework of our median voter model.

[12] See Margolis (1961).

selected measures that are representative of the wide variety of definitions of m/o that appear in the literature.

Our first measure of m/o is simply the municipal tax rate(MTXRT). This variant reflects the form in which the State of Michigan has recognized m/o in supplementing state aid for education. The m/o argument holds that a high non-school rate reduces the tax rate levied for schools and, therefore, education expenditures. The rationale for this quite plausible form of the m/o hypothesis may be seen in the context of a fixed overall local tax rate limitation setting, one such as we now observe in California and Massachusetts. In these states, clearly, a higher tax rate for municipal purposes, in communities operating at the ceiling rate, must mean a lower rate for schools. But there are no other states in which tax rate limitations are as rigidly legally binding.

There is another sense, however, in which an overall tax rate may be fixed. Higher taxes for either municipal or educational purposes may be seen by business firms as adding to the costs associated with location in the community. The same may be said of high income families. And neither set of taxpayers may see itself as benefiting appreciably from the supply of services financed. Portions of both groups may be induced by these taxes to leave the community.[13] At the same time the services may attract others who are heavy consumers and occupy less valuable property, thus driving up costs and perhaps leading to a process wherein, as tax rates go up, the tax base dwindles and the demand for local public goods rises. It is in this sense that the notion of a fixed tax rate pool may exist in many communities not otherwise subject to rigidly defined legal limitations. This is to say that it may be the case that as municipal tax rates rise it becomes increasingly difficult for the schools to levy any particular tax rate.[14]

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[13] Contrary to our earlier assumption that tax share of the median voter is independent of the level of expenditures or the tax rate.

[14] We are indebted to our colleague Roger Gordon for his insistence that we pursue this line of reasoning. However, as we have noted above, our tax price variable is constructed on the assumption that land use patterns are not influenced by levels of local tax rates or expenditures, and we have yet to see evidence that they

We then test the ratio of municipal to total (municipal plus school) tax rates(TRATIO), not because it seems to us to be a convincing articulation of the m/o concept, but rather because this version of the m/o hypothesis has been so often stated before the courts in recent litigation.[15]

It is sometimes claimed that high municipal expenditures as such constitute a measure of m/o. But expenditures do not in themselves burden taxpayers or voters. They are financed out of state and federal aid and nontax revenues such as user charges, fees, fines, and licenses, as well as taxes, and it is most unlikely that any of these, other than taxes can be seen as impinging on school financing any more than does any other voluntarily undertaken disposition of income. It seems to us that the measure of expenditures for municipal purposes that is relevant in this context is tax-financed expenditures per capita(TFEXP).[16]

A variant of this theme that may be appropriate for testing the m/o hypothesis is the ratio of tax-financed expenditures to personal income(TFYRTO). This variable provides a measure of the relative burden imposed by local taxes for municipal purposes.[17]

(cont'd) are.

[15] See, for example, the opinion of Judge Ross in Somerset County Board of Education et al v. David W. Hornbeck et al., Circuit Court of Baltimore, quoted in 295 Md. 597 (1983).

[16] Obviously TFEXP is identical to tax receipts, although the expenditures financed are not necessarily the same as those included in our definition of current operating expenditures. Thus an alternative way of viewing this variation of m/o is that it is the municipal tax level rather than the tax rate that impinges on expenditures for schools.

[17] The measures of m/o used in these first four tests are likely to be determined by many of the same influences that determine educational expenditures. To account for this, we conduct these tests using two-stage least squares(2SLS) rather than ordinary least squares(OLS). To create instruments we have used variables that affect demand for municipal services but not demand for school expenditures: density, fraction of housing stock that is old, percentage of property value that is industrial, percentage of the population that is black, and the unemployment rate. We used a slightly different set of variables in each state.

However, even when expenditures are reduced to the level financed by local taxation they continue to reflect the influences of income, price, and tastes or preferences. They reflect only in part circumstances giving rise to differences in "need." By "need" we mean a level of expenditures that is independent of income (including federal and state aid), price, and preferences; it is a function simply of the other characteristics of the community that govern demand for municipal services, such as population density, the incidence of poverty, aged housing and people, and so forth. To estimate "need"(NEED) we first estimate a demand equation for municipal operating expenditures,[18] then using the sample means for price, income, aid, and our proxies for preferences, we calculate NEED for each community.

The last of our m/o tests involves substituting income less "need" for median family income, to give us a variable that may be defined as a form of disposable income, "disposable" in the sense that municipal "needs" have been deducted. If the m/o argument is to gain support through this approach the equation containing YNEED in lieu of Y (median family income) should give us a better fit to the data.

Empirical Results

We have estimated our expenditure demand equations using samples of school districts from three states: Connecticut, New Jersey, and Virginia.[19] The results of our analysis, presented in Table 1, tend to be supportive of the median voter model. The elasticities generally have the expected sign and are within the range

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[18]The procedure we use to estimate demand for municipal expenditure is outlined in Appendix A.

[19]Our selection of these states was dictated in part by the fact that their school districts and municipalities are largely coterminous, and by a desire to achieve some degree of regional diversity. We included as many states as our resources would permit so as to ascertain whether or not behavioral patterns revealed in the analysis are robust across states.

suggested by earlier studies[20] and theoretical considerations. The overall fit of the regressions is good, as is indicated by the corrected values of R^2 that range from .55 for New Jersey to .77 for Connecticut.

The elasticity of tax price is consistently negative. Its value of −.14 in New Jersey, while clearly statistically significant, implies a high degree of insensitivity of demand to differences in price. This is less true in Connecticut and Virginia, where the coefficients are −.32 and −.28.

The level of family income plays a major role in the demand for education. The elasticities of demand with respect to income are .62 (Connecticut), .32 (New Jersey), and .43 (Virginia). An increase of $1 in income would be associated with an increase in per pupil expenditures of $.06 in Connecticut, $.04 in New Jersey, and $.06 in Virginia.[21]

Recall that, in our model, lump-sum federal and state aid for education is equivalent to an increase in income for the median voter equal to total aid times his tax share. The elasticity with respect to basic aid is not significantly different from zero in any of the states. We expect categorical or earmarked aid to have a substantially larger effect on expenditures than unrestricted aid because it often supports mandated programs on which districts would otherwise spend nothing. Our results support this hypothesis, although somewhat tentatively, in that some of the relevant coefficients are not quite significant at the five per cent level.

Of the preference proxies that we have included among our explanatory variables, the percentage of housing that is owner-occupied (OOC) stands out as most consistently significant across states. Other things equal, owners prefer to spend less on education than renters.

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[20]See, for example, Lovell (1978).

[21]We compute the absolute change in expenditure given a one unit change in income by multiplying the income elasticity by the ratio of the means of expenditure and income.

Table 1. Demand for Education Expenditures
Parameter Estimates, 1981-1982

Predictor Variables	Connecticut	New Jersey	Virginia
CONSTANT	4.4† (1.7)	5.4* (.65)	2.4 (1.6)
TAXPRICE	-.32* (.078)	-.14* (.038)	-.28* (.096)
MEDFMY	.62* (.13)	.32* (.060)	.48* (.16)
BASICAID	-.0016 (.0037)	.013 (.015)	-.14 (.076)
STCATAID	.064 (.034)	.0025 (.0097)	.26* (.085)
FEDAID	-.0089 (.034)	.032* (.0076)	.14* (.036)
AGED	.16* (.059)	.090* (.025)	-.0065 (.060)
SECPUP	-.092 (.13)	.18* (.050)	.049 (.15)
NOHS	-.097† (.040)	-.047† (.021)	.046 (.066)
VOTE	.18* (.064)	.068† (.032)	.068 (.063)
PUPFM	.12 (.12)	.076 (.050)	-.27† (.12)
ENRGR	-.57* (.19)	-.28* (.10)	-.26 (.17)
OOC	-.26* (.080)	-.12* (.028)	-.35* (.11)
PRIV	.015 (.023)	.029† (.013)	-.014 (.013)
POVT	.00013 (.028)	-.013 (.015)	-.010 (.064)

Predictor Variables	Connecticut	New Jersey	Virginia
PUP	-.91* (.24)	-.18† (.085)	-.21 (.15)
PUPSQ	.057* (.015)	.011† (.0055)	.012 (.0088)
DEPDIST		-.036 (.028)	
MEMB		-.13* (.023)	
NONRS	-.0077 (.0060)	-.0017 (.0041)	
SENT	-.033* (.011)	-.0080 (.0042)	
$\bar{R}^2$	.77	.55	.73
n	99	380	121
SEE	.080	.12	.10

Notes:

1) Standard errors appear in parentheses.

2) All regression equations are in log-linear form.

3) Coefficients marked with a dagger (†) are significant at the 5 percent level, and those marked with an asterisk (*) are significant at the 1 percent level.

The coefficients of our other measures of voter preferences, the proportion of the adult population that did not attend high school (NOHS) and the proportion who voted Democratic (VOTE), are consistently negative and positive, respectively, in Connecticut and New Jersey. Neither is statistically significant in Virginia.

Our results do not support the view that the presence of a large elderly population (AGED) tends to depress spending on education. Similarly, the incidence of poverty (POVT) does not affect spending.[22]

We can draw some conclusions about the effects of school characteristics, although these findings are not always supported by statistically significant coefficients in all three states. Higher rates of enrollment growth (ENRGR) generally are associated with lower spending. The effect of district size (PUP and PUPSQ) is non-linear, with spending first rising and then falling as district size increases. The presence of nonresident pupils (NONRS), the proportion of pupils sent to school in other districts (SENT), and the proportion of pupils in high school (SECPUP) do not have a systematic influence on expenditure for education across states. And, in New Jersey, membership in a regional high school district (MEMB) reduces spending, while the hypothesis that being a dependent district (DEPDIST) increases expenditures is not supported.

While we find that the variables included in our demand equations, most notably price and income, explain a large part of the variance in each of our states,[23] unexplained variance ranging from 40 per cent in New Jersey to 20 per cent in Connecticut remains. Obviously there are omitted variables, of which m/o in one or other of its manifestations may be one. We turn now to our tests of this issue.

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[22]This is not surprising when we recall that the poverty coefficient is measuring the effect of poverty when such other factors as median family income are held constant.

[23]Tax price and median family income by themselves account for 42 per cent of total variance in demand for education in Connecticut, 19 per cent in New Jersey, and 32 per cent in Virginia. Community characteristics raise these proportions by 27, 23, and 33 percentage points, repectively, in the three states.

The Municipal Overburden Tests

We have tested each of the six versions of the m/o hypothesis outlined above by including it, one at a time, in our estimating equation for the demand for education. The results are presented in Table 2.[24] In the first five tests, if the coefficient on our variable representing a measure of m/o were negative and statistically significant, we would claim to have found support for the m/o hypothesis. In fact, however, the one coefficient that is significant is positive.

In the sixth test income minus "need" is substituted for median family income. Support for the m/o hypothesis requires that these equations better explain variance in education expenditures than do those containing median family income. For all three states the substitution produces slightly lower values for 't' for the income variable and no higher or somewhat lower values for R^2.

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[24]See Appendix B for the full set of equations.

Table 2. Tests for Municipal Overburden Parameter Estimates, 1981-1982

Municipal Overburden Test Variables	Connecticut		New Jersey		Virginia	
	Parameter Estimate	$\bar{R}^2$	Parameter Estimate	$\bar{R}^2$	Parameter Estimate	$\bar{R}^2$
MTXRT	-.082 (.073)	.74	.096 (.054)	.53	.12 (.10)	.69
TRATIO	-.12 (.15)	.74	.22 (.13)	.47	.19 (.16)	.55
TFEXP	-.24 (.27)	.49	-.12 (.095)	.46	-.023 (.075)	.70
TFYRATIO	-.16 (.18)	.62	-.11 (.10)	.47	.036 (.073)	.74
NEED	-.21 (.13)	.78	.17 (.13)	.55	.066† (.033)	.73
YNEED	.58* (.12)	.77	.25* (.054)	.54	.45* (.15)	.73

Notes:

1) Standard errors appear in parentheses.

2) All regression equations are in log-linear form.

3) Coefficients marked with a dagger (†) are significant at the 5 percent level, and those marked with an asterisk (*) are significant at the 1 percent level.

Conclusions

Our efforts to find evidence supportive of the m/o hypothesis comes up quite empty. A hypothesis that seems plausible on its face, if not when scrutinized carefully in terms of the economics of demand, fails our empirical tests. Among the facts underlying this finding is that the tax cost of municipal non-school services amounts only to an average of 2.8 per cent of personal income in Connecticut, 3.4 per cent in New Jersey, and 2 per cent in Virginia. Furthermore, much of the these proportions of income may not be borne in the community, or may not be perceived as being borne there. Variance in expenditures on local public goods that absorb so little of income is unlikely to exert an observable influence on the demand for education.

A second relevant observation is that demand for municipal services and demand for education are influenced by much the same factors, so that where the demand for one is high the demand for the other is also likely to be high. This appears to be parrticularly true in Connecticut and Virginia, where the simple correlation coefficients between municipal and education expenditure are, respectively, .60 and .70. The coefficient for New Jersey communities is considerably lower, at .26.

Our most important finding is that demand for elementary and secondary education, essentially a publicly supplied private good, behaves just about as we should expect demand for any "normal" good to behave. The quantity demanded responds positively to income and negatively to price, with elasticities that are within the expected range for a good that absorbs an appreciable fraction of income, for which quality can be varied, and for which there are substitutes.

Proxies for preferences also play their expected roles, some with more clarity than others, but on the whole they offer no large surprises.

Federal and state aid influence (or fail to influence) demand for education in ways that are not satisfactorily placed within either the income-constraint expanding role or the "flypaper" mode. Only the notion of categorical aid and its related andated programs yielding "corner solutions" at levels of expenditure greater than those that would be preferred in the absence of the binding constraint requiring the provision of service, seems well supported.

Finally, as the findings presented in Appendix A make clear, none of the orces so often alleged to lead "inexorably" to high expenditures for municipal functions is found to do so. Apparent exceptions are being a central city, high unemployment, density, and incidence of aged people in New Jersey. But even here the quantitative impact is too small to sustain the claims made for these factors.

Appendix A. Demand for Municipal Services

We have two reasons for estimating the demand for municipal services. One is to obtain the equations that permit us to estimate "need." The other is to test the validity of one of the common underpinnings of the m/o hypothesis, that such conditions as a high incidence of poverty, unemployment, older housing, and aged people, and high population density give rise "inexorably" to high per capita expenditures for non-school local public goods.

Using the same methodological approach as we outlined in the case of the demand for education, we specify the demand equation for municipal expenditures in log-linear form as

$$\ln E_m = \ln B + \zeta \ln P_m + \eta \ln P_e + \kappa \ln Y + \Sigma \lambda_i \ln Z_i + \mu$$

where P_m is the price of municipal services, P_e is the price of education, Y is median family income, and Z is a vector of proxies for voter-consumer preferences and community characteristics thought to influence the demand for municipal services, plus state and federal aid (ASMNT and AFMNT).[25] The community characteristics include DENS, AGED, OLDHSE, UNEMRT, POP, POVT, CENCI Y, and NSMSA (being outside a Standard Statistical Metropolitan Area). OCC and VOTE are, again, entered as proxies for preferences.[26]

We estimate demand for municipal services using two forms of the dependent variable. The first is current operating expenditure per capita (CURREXP), and the

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[25] As in the equation for the demand for education, we cannot include both P_e and P_m because we are unable to distinguish between them.

[26] Other variables with which we experimented were the ratio of empoyment to population, proportion of the population black and Puerto Rican, NOHS, and the rate of population growth. These variables added nothing appreciable to explained variance, nor do they offer compelling theoretical reasons for their inclusion in our equations.

second is CURREXP less user charges (EXPNOCHG).[27] We use the latter in the estimation of NEED in our tests of the m/o hypothesis.

As may be seen in Table A, the results are generally consistent with those of other studies and with standard theory. Our equations account for 80 to 90 per cent of variance in expenditures in Connecticut and Virginia, and for over 60 per cent in New Jersey. Most of the explained variance is contributed by income and price, federal and state aid (treated, as in the education equations, in the manner of an income supplement), and such proxies for preferences as VOTE and OCC. Little help is offered by the community characteristics so often held to compel high expenditures, except for CENCITY and UNEMRT in New Jersey, and DENS in Virginia.[28]

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[27]Expenditures include those of the overlying county in New Jersey, allocated pro rata by population. In Connecticut the counties are of no significance, and in Virginia they do not overly the cities; there outside of the cities the counties are our units of observation.

[28] There are two other statistically significant coefficients in the New Jersey equations, but their values are very low (less than .07).

Table A. Demand for Municipal Expenditures: Parameter Esti[illegible]s, 1981 - 1982

	Connecticut		New Jersey		Virginia	
Predictor Variables	CURREXP	TFEXP	CURREXP	EXPNOCHG	CURREXP	TFEXP
CONSTANT	-5.8* (1.6)	-6.6† (2.7)	2.2* (.73)	2.3* (.73)	-3.3 (2.2)	-12.5† (5.6)
MEDFMY	1.0* (.19)	1.2* (.32)	.26* (.086)	.22* (.085)	.59† (.26)	1.3† (.68)
TAXPRICE	-.49* (.099)	-.30 (.17)	-.56* (.041)	-.57* (.041)	-.71* (.092)	-.53† (.23)
DENS	.050 (.040)	.13 (.066)	.022* (.0087)	.014 (.0087)	.13* (.023)	.28* (.059)
POP	.12† (.045)	.096 (.076)	.022 (.014)	.028† (.014)	.023 (.025)	.18* (.063)
OOC	-.55* (.15)	-.72* (.25)	-.23* (.043)	-.21* (.043)	-.1[illegible] (.17)	.037 (.44)
AGED	.16 (.090)	.26 (.15)	.064† (.030)	.048 (.030)	.12 (.098)	-.083 (.25)
OLDHSE	.065 (.059)	.059 (.099)	.012 (.016)	.020 (.016)	-.082 (.05[illegible])	-.034 (.13)
UNEMRT	.074 (.084)	-.034 (.14)	.14* (.036)	.14* (.036)	.12 (.073)	.10 (.19)
POVT	.058 (.060)	.044 (.10)	.022 (.022)	.020 (.022)	.024 (.10)	.0054 (.26)
FEDAID	.15* (.029)	.11† (.048)	.032 (.024)	.048† (.024)	.12* (.035)	-.45* (.090)
STAID	.014 (.039)	-.42* (.066)	.30* (.025)	.31* (.025)	.49* (.094)	.68* (.24)
VOTE	.36* (.13)	.47† (.22)	-.051 (.048)	-.051 (.048)	.034 (.11)	.46 (.28)
CENCITY	.031 (.086)	.22 (.14)	.18* (.052)	.17* (.052)	.12 (.083)	.18 (.21)

	Connecticut		New Jersey		Virginia	
Predictor Variables	CURREXP	TFEXP	CURREXP	EXPNOCHG	CURREXP	TFEXP
NSMSA	-.053 (.063)	.051 (.10)	-.016 (.035)	-.0095 (.035)	.12† (.052)	.31† (.13)
$\bar{R}^2$	.80	.65	.61	.61	.87	.65
n	99	99	380	380	121	121
SEE	-.17	.29	.17	.17	.19	.49

Notes:

1) Standard errors appear in parentheses.

2) All regression equations are in log-linear form.

3) Coefficients marked with a dagger (†) are significant at the 5 percent level, and those marked with an asterisk (*) are significant at the 1 percent level.

4) We were unable to compute TFEXP properly for New Jersey, so we used EXPNOCG in its place.

Appendix B. Empirical Tests of the Municipal Overburden Hypothesis

This appendix contains detail of the regressions we performed as tests of the municipal overburden hypothesis. These regression results are discussed in the section above entitled, "The Municipal Overburden Tests."

Notes:

1) Standard errors appear in parentheses.

2) All regression equations are in log-linear form.

3) Coefficients marked with a dagger are significant at the 5 per cent level, and those marked with an asterisk are significant at the 1 percent level.

Table B.1 Demand for Education Expenditures
Parameter Estimates, Connecticut, 1981-82

Predictor Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CONSTANT	4.4† (1.7)	3.2 (2.1)	2.9 (2.5)	.91 (4.8)	2.3 (3.3)	5.2* (1.7)	5.0* (1.6)
TAXPRICE	-.32* (.078)	-.36* (.092)	-.38* (.10)	-.53† (.26)	-.45† (.18)	-.32* (.078)	-.32* (0.79)
MEDFMY	.62* (.13)	.68* (.15)	.69* (.16)	1.1† (.56)	.75* (.23)	.66* (.13)	
BASICAID	-.0016 (.0037)	-.0041 (.0046)	-.0028 (.0042)	-.0058 (.0076)	-.0052 (.0065)	-.0020 (.0037)	-.0010 (.0037)
STCATAID	.064 (.034)	.083† (.040)	.054 (.038)	.017 (.075)	.034 (.057)	.069† (.034)	.067 (.034)
FEDAID	-.0089 (.034)	.016 (.043)	.020 (.050)	.046 (.082)	.021 (.057)	-.0063 ([illegible])	-.0095 (.034)
AGED	.16* (.059)	.14† (.065)	.13 (.070)	.14 (.097)	.14 (.082)	.21* (.067)	.17* (.059)
SECPUP	-.092 (.13)	-.081 (.14)	-.064 (.14)	-.051 (.21)	-.070 (.17)	-.081 (.13)	-.084 (.13)
NOHS	-.097† (.040)	-.10† (.044)	-.094† (.044)	-.13 (.074)	-.12† (.059)	-.089† (.040)	-.10† (.040)
VOTE	.18* (.064)	.20* (.070)	.18† (.069)	.21† (.11)	.22† (.094)	.16† (.065)	.18* (.065)
PUPFM	.12 (.12)	.027 (.15)	.014 (.18)	-.025 (.25)	.053 (.17)	.039 (.13)	.13 (.12)
ENRGR	-.57* (.19)	-.53* (.21)	-.53† (.22)	-.49 (.32)	-.54† (.26)	-.65* (.20)	-.58* (.20)
OOC	-.26* (.080)	-.29* (.090)	-.31* (.11)	-.46 (.26)	-.40† (.20)	-.32* (.088)	-.27* (.083)
PRIV	.015 (.023)	.012 (.025)	.014 (.025)	.010 (.038)	.013 (.031)	.012 (.023)	.017 (.023)
POVT	.00013 (.028)	-.00041 (.030)	.0062 (.030)	.016 (.048)	.014 (.040)	.019 (.030)	.00025 (.028)

Predictor Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PUP	-.91* (.24)	-.87* (.26)	-.83* (.28)	-1.1† (.42)	-.97* (.33)	-.95* (.24)	-.96* (.24)
PUPSQ	.057* (.015)	.055* (.016)	.052* (.017)	.068† (.027)	.062* (.021)	.061* (.015)	.060* (.015)
NONRS	-.0077 (.0060)	-.0063 (.0066)	-.0057 (.0069)	-.0037 (.011)	-.0054 (.0084)	-.0099 (.0061)	-.0082 (.0061)
SENT	-.033* (.011)	-.035* (.012)	-.035* (.012)	-.046† (.023)	-.041† (.017)	-.034* (.011)	-.032* (.011)
MTXRT		-.082 (.073)					
TRATIO			-.12 (.15)				
TFEXP				-.24 (.27)			
TFYRATIO					-.16 (.18)		
NEED						-.21 (.13)	
YNEED							.58* (.12)
$\bar{R}^2$	.77	.74	.74	.49	.62	.78	.77
n	99	99	99	99	99	99	99
SEE	.080	.086	.086	.13	.10	.079	.080

Table B.2 Demand for Education Expenditures
Parameter Estimates, New Jersey, 1981-82

Predictor Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CONSTANT	5.4*	5.3*	5.5*	6.3*	6.4*	4.0*	6.1*
	(.65)	(.67)	(.71)	(1.0)	(1.2)	(1.2)	(.59)
TAXPRICE	-.14*	-.11*	-.085	-.16*	-.17*	-.13*	-.13*
	(.038)	(.041)	(.052)	(.045)	(.050)	(.038)	(.038)
MEDFMY	.32*	.31*	.33*	.32*	.20	.34*	
	(.060)	(.061)	(.066)	(.067)	(.13)	(.061)	
BASICAID	.013	-.010	-.0034	.0059	.010	.012	.0091
	(.015)	(.020)	(.019)	(.017)	(.016)	(.015)	(.015)
STCATAID	.0025	.00062	.0037	.0047	.0050	.0028	.0028
	(.0097)	(.010)	(.010)	(.011)	(.011)	(.0096)	(.0097)
FEDAID	.032*	.035*	.033*	.035*	.035*	.032*	.032*
	(.0076)	(.0080)	(.0083)	(.0089)	(.0090)	(.0076)	(.0077)
AGED	.090*	.061†	.063†	.13*	.11*	.073*	.093*
	(.025)	(.030)	(.031)	(.040)	(.034)	(.028)	(.025)
SECPUP	.18*	.17*	.20*	.18*	.18*	.18*	.18*
	(.050)	(.051)	(.055)	(.055)	(.054)	(.049)	(.050)
NOHS	-.047†	-.028	-.031	-.077†	-.069†	-.050†	-.054*
	(.021)	(.024)	(.024)	(.034)	(.031)	(.021)	(.021)
VOTE	.068†	.032	.050	.061	.062	.061	.065†
	(.032)	(.038)	(.036)	(.035)	(.035)	(.032)	(.032)
PUPFM	.076	.071	.068	.14	.15	.062	.099†
	(.050)	(.051)	(.055)	(.072)	(.085)	(.051)	(.050)
ENRGR	-.28*	-.30*	-.31*	-.34*	-.33*	-.27*	-.29*
	(.10)	(.10)	(.11)	(.12)	(.12)	(.10)	(.10)
OOC	-.12*	-.067	-.059	-.16*	-.16*	-.11*	-.12*
	(.028)	(.041)	(.047)	(.041)	(.046)	(.029)	(.029)
PRIV	.029†	.018	.015	.042†	.042†	.024	.034*
	(.013)	(.014)	(.016)	(.018)	(.018)	(.013)	(.012)
POVT	-.013	-.013	-.012	-.011	-.013	-.020	-.017
	(.015)	(.015)	(.016)	(.016)	(.016)	(.016)	(.015)

Predictor Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PUP	-.18† (.085)	-.13 (.092)	-.17 (.093)	-.24† (.10)	-.23† (.099)	-.17† (.086)	-.18† (.087)
PUPSQ	.011† (.0055)	.0075 (.0061)	.010 (.0061)	.016† (.0068)	.015† (.0066)	.010 (.0056)	.012† (.0056)
NONRS	-.0017 (.0041)	-.0021 (.0042)	-.0043 (.0048)	.0016 (.0054)	.0012 (.0054)	-.0020 (.0041)	-.0021 (.0041)
SENT	-.0080 (.0042)	-.0086† (.0044)	-.012 (.0054)	-.0051 (.0053)	-.0057 (.0051)	-.0078 (.0042)	-.0086† (.0043)
DEPDIST	-.036 (.028)	-.031 (.029)	-.062 (.034)	-.036 (.033)	-.040 (.032)	-.038 (.028)	-.033 (.028)
MEMB	-.13* (.023)	-.14* (.024)	-.13* (.025)	-.12* (.026)	-.13* (.025)	-.13* (.023)	-.13* (.023)
MTXRT		.096 (.054)					
TRATIO			.22 (.13)				
TFEXP				-.12 (.095)			
TFYRATIO					-.11 (.10)		
NEED						.17 (.13)	
YMNEED							.25* (.054)
$\bar{R}^2$	.55	.53	.47	.46	.47	.55	.54
n	380	380	380	373	373	380	380
SEE	.12	.12	.13	.13	.13	.12	.12

Table B.3 Demand for Education Expenditures
Parameter Estimates, Virginia, 1981-82

Predictor Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CONSTANT	2.4 (1.6)	2.8 (1.8)	2.4 (2.1)	2.3 (1.7)	2.6 (1.6)	2.0 (1.6)	2.8 (1.5)
TAXPRICE	-.28* (.096)	-.36* (.12)	-.34† (.14)	-.26† (.12)	-.31* (.12)	-.34* (.10)	-.27* (.096)
MEDFMY	.48* (.16)	.51* (.17)	.58* (.23)	.51* (.18)	.47* (.15)	.46* (.15)	
BASICAID	-.14 (.076)	-.082 (.099)	-.11 (.10)	-.17 (.12)	-.10 (.11)	-.12 (.075)	-.15 (.076)
STCATAID	.26* (.085)	.15 (.14)	.24† (.12)	.27* (.096)	.24* (.091)	.27* (.084)	.27* (.085)
FEDAID	.14* (.036)	.17* (.050)	.14* (.049)	.13* (.038)	.14* (.036)	.15* (.036)	.13* (.036)
AGED	-.0065 (.060)	-.00055 (.065)	.034 (.087)	-.010 (.063)	.0035 (.062)	-.012 (.059)	-.0087 (.060)
SECPUP	.049 (.15)	.[illegible]2 (.18)	.041 (.21)	.040 (.16)	.058 (.15)	.073 (.15)	.051 (.16)
NOHS	.046 (.066)	.16 (.13)	.13 (.11)	.030 (.085)	.069 (.079)	.076 (.066)	.039 (.065)
VOTE	.068 (.063)	-.024 (.11)	-.0011 (.10)	.082 (.080)	.045 (.078)	.068 (.062)	.073 (.063)
PUPFM	-.27† (.12)	-.21 (.14)	-.12 (.21)	-.28† (.14)	-.25† (.13)	-.24† (.12)	-.27† (.12)
ENRGR	-.26 (.17)	-.11 (.23)	-.16 (.24)	-.28 (.19)	-.23 (.18)	-.18 (.17)	-.27 (.17)
OOC	-.35* (.11)	-.34 (.12)	-.44* (.17)	-.35* (.11)	-.33* (.11)	-.25† (.12)	-.37* (.11)
PRIV	-.014 (.013)	-.012 (.014)	-.014 (.017)	-.014 (.013)	-.013 (.013)	-.0073 (.013)	-.014 (.013)
POVT	-.010 (.064)	-.030 (.072)	-.0040 (.086)	-.0062 (.068)	-.018 (.064)	-.025 (.063)	-.013 (.064)

Predictor Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PUP	-.21 (.15)	-.28 (.18)	-.38 (.25)	-.21 (.16)	-.23 (.15)	-.17 (.15)	-.22 (.15)
PUPSQ	.012 (.0088)	.016 (.010)	.020 (.014)	.012 (.0092)	.012 (.0087)	.0091 (.0088)	.013 (.0088)
MTXRT		.12 (.10)					
TRATIO			.19 (.16)				
TFEXP				-.023 (.075)			
T[illegible]YRATIO					.036 (.073)		
NEED						.066† (.033)	
YMNEED							.45* (.15)
$\bar{R}^2$	.73	.69	.55	.70	.74	.73	.73
n	121	121	121	121	121	121	121
SEE	.10	.11	.14	.10	.099	.10	.10

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