ALTERNATIVE FORMS OF TAXATION TO ACHIEVE EQUITABLE LEVELS OF EDUCATIONAL EXPENDITURES

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INTRODUCTION

Pressures are increasing for reforms in financing of local government services. At the local level, the property tax is a major source of concern.[1] Two major charges leveled against the property tax are (1) that the property tax is regressive and (2) that financing local government services through the property tax leads to inequities in services received.

The charge that the property tax is regressive stems from the fact that it is a tax on wealth and not on income. The amount of real property owned by a person is not necessarily proportional to his ability to pay taxes. Several studies [2, 12, 17, 18] have shown that property taxes are regressive; i.e., that low-income families pay a greater percentage of their income for public services than do middle- and upper-income families.

Another major source of dissatisfaction arises from the fact that the geographic location of the property tax base does not always correspond with the location of the need for property tax-financed services. Recent court decisions have ruled that disparities in the property tax basis of school districts result in unequal educational opportunities.

Currently, there is a great deal of interest in relieving the burden of the property tax. Several states have reduced property taxes for selected groups, the elderly, homeowners and farmers. Other states have offered more widespread relief of property taxes. In any case, lower revenues resulting from less reliance on the property tax must be made up from other sources if public service levels and quality remain unchanged.

If other sources of taxation are used they also must be evaluated relative to the concepts of equity and regressiveness on taxpayers. One frequently mentioned alternative to the property tax is a local income tax. Local income tax may be applied as simply a percentage of the state income tax payments or, in a more restricted sense, it is applied as an earnings tax.

OBJECTIVES

The overall objective of this research is to analyze equity with respect to taxpayers and school children. First, it attempts to compare the regressiveness on taxpayers of property versus local income taxes. Local services received are assumed to be the same regardless of tax source. Level of services delivered, however, may be related to measures of tax incidence. The level of services provided is different in urban and rural areas, but so is the relationship of property to income levels. Thus, a second objective is to determine equitable levels of service in rural and urban areas and measures of tax incidence in these areas when services are provided via property or income taxes.

PROCEDURE

We approach the question of equity from two points of view. First, our research identifies equity for taxpayers as the supply and demand equilibrium

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[1] The property tax accounts for almost 90 percent of all taxes collected by local governments in Georgia [20, p. 31], and a major portion of the tax pays the local contribution to public schools.

of local tax revenues for education. An econometric model is constructed for the purpose of estimating the equilibrium. Second, we identify equity for school children as the opportunity to receive a minimum level of major educational inputs. We define one concept of equal opportunity as a minimum level of certain classroom expenditures and introduce this into three counties that currently offer below-average levels of educational opportunity.

Given the identified levels of educational service to be offered, the effects of tax incidence are identified when the levels are reached by either property tax or income tax. Measures of tax incidence were found by obtaining estimates of the distribution of income tax due in each county and cross-classifying this distribution with the distribution of property taxes due.

The cross-classification was made possible by a sample of paired comparisons of property and state income tax returns. Property tax returns were identified as including owner occupied dwellings showing a homestead exemption and containing not more than five acres within a city or not more than 20 acres outside a city. Samples were randomly selected and the property owner was identified with an income tax locater file. If it was not possible to find or positively identify the owner, then a substitute property owner was used. When a tax return was located the income data (including spouse's income were shown separately filed) was recorded.

Supply and Demand as an Approach to Equity for Taxpayers

A theoretical concept of supply and demand was structured as a set of simultaneous equations which were estimated from cross-sectional data describing public school expenditures in 158 counties of Georgia. Then, equilibrium levels of total school expenditure and supply and demand of local expenditure were estimated.

The Model

A four equation model is specified in which tax effort, achievement, total expenditures, and local expenditures are the four endogenous variables. The Advisory Commission on Inter-Governmental Relations [1] suggests that tax effort is effectively measured by the ratio of tax revenue to personal income. Thus, aggregate county demand is expressed as tax effort and defined to be:

$$LXDY = \frac{LX}{I - LX}$$

where:

LXDY = local tax effort,
LX = total local contribution for educational expenditures, and
I = county income.

Demand as tax effort was hypothesized to be endogenously related to quality of output; i.e., consumers as taxpayers are expected to increase tax effort whenever quality of output is increasing. Tax effort was also hypothesized to be related to (1) wealth as measured by the county property tax digest; (2) dependency rates as measured by number of children per capita (ADA/POP); (3) outside federal and state (OT) help; (4) income (LY); (5) percentage of population black (BLK); (6) size of population as measured by population per county (POP) and, finally; (7) historical levels of demand ($LXDY_{t-1}$) because of the length of time required for the LXDY ratio to be affected by the socio-political process.

Test scores, or student achievement scores (ACH), are the most immediately recognizable results that taxpayers observe from the educational system. Although other measures of output both quantifiable and nonquantifiable exist, it is assumed that the taxpayers' perception of educational output is closely related to achievement scores. In addition, expenditures and achievement scores are hypothesized to be endogenously determined, i.e., taxpayers are more likely to support the educational system if its performance is high. Thus, this research hypothesizes that demand behavior of taxpayers is directly modified as a function of the observed level of quality as measured by achievement scores. The level of demand and LXDY are hypothesized to rise as achievement levels rise. Achievement is also endogenously related to educational inputs as measured by per pupil expenditures (EXP). Exogenous influences also affect the achievement equation. Achievement is widely held to be greatly influenced by the socio-economic background of the student [4, 5]. In this study, variables affecting achievement were considered to be the county average mean years of schooling (MYS), percentage of the county's population that was black (BLK), and average IQ scores in the county (LIQ).

Achievement as an index of output quality has been found by other investigators to be related to per pupil expenditures (EXP) as a performance measure [5]. The logical assumption is that higher quality output has a higher unit cost. Our estimates of expenditures are adjusted for quality by including achievement in the equation for EXP. The number of students, or ADA, was expected to affect educational costs per student. Several researchers reported that

school district operations exhibited economies of size [3, 13, 14, 15, 16]. In addition to differing levels of ADA per local school system, school systems also exhibited differences in the pupil-teacher ratio (PTR), average salaries paid to teachers (AVSAL) and average non-teacher instructional expenditures per classroom (INS). Increases in PTR tend to decrease expenditures while increases in salaries and classroom expenses raise expenditures.

This model is closed by specifying that total current expenditure (TX) minus local expenditure equals state and federal expenditures or outside effort (OT). This form leaves outside state and federal effort as exogenous to the model, which indeed it must be in most instances. Outside help is, however, an important policy variable that may be exogenously adjusted to simultaneously bring local tax effort (LXDY) into equilibrium with local costs.

Data for the Supply-Demand Model

Data from 158 Georgia counties[2] were used in the simultaneous regression equations to estimate the supply-demand relationships for education. Information for the 1970-71 school year was obtained from several sources; the principal source being Georgia Department of Education. Publications from the Department of Education provided information of receipts [8], expenditures [6], school district size [7] and achievement scores [9]. Average eighth grade scores on the Iowa Test of Basic Skills were used to measure educational quality. Current expenditures used were reported as current expenditures net of transportation costs. Local expenditures were estimated by multiplying total current expenditures by the ratio of local receipts to total receipts. A similar procedure was used to estimate expenditures financed from state and federal government sources. Average ADA per school district measured size of district and was used in the analysis to account for economies and diseconomies of size.

Several other data sources were also used. The 1970 U.S. Census of Population [19] provided estimates of median years of schooling, county population and percentage of population that is black. The Georgia Department of Revenue [11] compiled tax digest estimates which were used to measure county wealth. The tax digest was divided by number of students in average daily attendance (ADA) to estimate the county's ability to support education. Estimates of county income used in the analysis were reported by the Office of Business Economics [21].

RESULTS OF SUPPLY-DEMAND MODEL

Statistical Estimates

Equations of the model were estimated by two-stage least squares; the coefficients, Student's t, and R^2 values are shown below:

(1) $ACH = 60.45 + 0.00534\ EXP + 1.346\ MYS - 0.2046\ BLK - 6.740\ LIQ$
$R^2 = 0.82$ (1.864) (7.540) (−19.35) (−5.640)

(2) $LXDY = -3.964 + 0.0536\ ACH + 0.0060\ DIGEST + 0.0099\ BLK + 0.0334\ ADA/POP - 0.0018\ OT/ADA - 0.1306\ POP + 1.084\ LXDY_{67} + 0.6133\ LY$
$R^2 = 0.84$ (2.593) (1.628) (1.949) (1.926) (−2.846) (−1.745) (16.38) (4.309)

(3) $EXP = 553.4 + 1.233\ ACH - 2.482\ ADA + 0.0661\ (ADA)^2 - 29.87\ PTR + 57.18\ AVSAL + 0.0632\ INS$
$R^2 = 0.90$ (2.487) (−3.029) (3.547) (−22.39) (12.48) (21.14)

(4) $TX - LX = OT$

Equilibrium values of local, state and federal, and total expenditures can be found for each county by solving the above system of equations. In other words, what the county is willing and able to pay just equals the difference between total expenditures and outside, or state and federal, contributions.

Analysis of Tax Incidence and Equity in Three Counties

Counties of the state were sorted into three equal groups based on population size and one county was selected from each group. Per pupil expenditures in these three counties were equal but below average. Thus the counties could be used to evaluate the impact of raising per pupil expenditures. The counties could be characterized further as follows: (1) the first county was totally rural with agriculture as the base industry, (2) the largest town in the second county had less than 10 thousand population, and (3) the

[2] Included in the analysis were all of Georgia's counties, with the exception of Chattahoochee which is primarily a military reservation.

third county was a large urban fringe county with a high percentage of high-income earners but a very small industrial base. Thus in each of these counties personal income and personal property would be important sources of revenue. These are also the sources consistent with the paired sample comparisons.

Tax Incidence. The estimated property tax liability was larger than the state income tax liability in each of the three counties. The ratio of income tax liability to property tax liability became larger as the size of population increased, but in the largest county the property tax liability was more than a million dollars greater than income tax liability (Table 1).

The variation of property tax liability among areas and variation in assessments and millage rates contributes no doubt to the different level of educational services per county. This variation plus the variation in income among the counties combine to produce significant differences in the incidence of property and income taxes. Even so, the incidence of the property tax was decidedly regressive in all counties and the incidence of the state income tax was consistently progressive (Table 2). The distribution of the state income tax incidence by income level was similar in all counties. This is to be expected as everyone pays the same tax rates for a given level of income in Georgia.

The property tax is particularly regressive on low

Table 1. POPULATION, SCHOOL ATTENDANCE, AND INCOME AND PROPERTY TAX CHARACTERISTICS OF THREE COUNTIES IN GEORGIA, 1970.

Characteristics	Unit	Small	Medium	Large
Population	No.	9,281	16,928	98,043
Average Daily Attendance (ADA)	No.	2,408	3,900	24,982
Personal Income Tax Liability	Dol.	108,706	332,406	3,151,653
Total Property Tax Liability	Dol.	324,958	576,439	4,972,930

Table 2. INCIDENCE OF LOCAL PROPERTY TAXES AND STATE INCOME TAXES IN THREE COUNTIES OF GEORGIA, 1970.[a]

Gross Adjusted Income	Property Taxes as a Percentage of Income			Income Taxes as a Percentage of Income		
	Small	Medium	Large	Small	Medium	Large
Over 15,000	1.11	0.81	1.81	3.15	3.27	2.88
12,000 – 15,000	2.45	1.01	1.50	1.68	1.54	1.44
9,000 – 12,000	0.93	1.29	2.11	1.05	1.06	1.00
6,000 – 9,000	1.31	0.88	2.45	0.58	1.43	0.71
3,000 – 6,000	2.33	1.68	2.67	0.26	0.39	0.47
Under 3,000	3.27	1.20	4.34	0.10	0.07	0.12

[a]Tax incidence may be read in the table as dollars of tax due per 100 dollars of Gross Adjusted Taxable Income.

Table 3. NUMBER OF FAMILIES AND PERCENT OF FAMILIES BY CLASS OF INCOME IN THREE GEORGIA COUNTIES, 1970.

Gross Adjusted Income	Number of Families			Percentage of Families		
	Small	Medium	Large	Small	Medium	Large
Over 15,000	210	382	5,143	8.90	8.19	20.20
12,000 – 15,000	146	386	5,243	6.19	8.27	20.60
9,000 – 12,000	310	925	6,645	13.14	19.82	26.10
6,000 – 9,000	563	1,211	4,958	23.86	25.95	19.48
3,000 – 6,000	652	1,036	2,370	27.63	22.20	9.31
Under 3,000	479	727	1,097	20.30	15.58	4.31
Total	2,360	4,667	25,456	100.00	100.00	100.00
Families and Unrelated individuals	2,769	5,219	29,023			

income earners (families with less than $6,000 gross adjusted income). In the counties with small and medium populations, low-income families' share of the total tax bill is much larger than that of low-income families in the large county. While 48 percent of families in the small county and 38 percent of the families in the medium county earn less than $6,000, only 14 percent are in this class in the large county (Table 3). A change from property tax as a source of funds for educational services would thus shift the tax burden from the poor to the rich and this effect would be most dramatic in counties like the large county which has a high proportion of earners in the upper income brackets (Table 3).

Equity. The actual level of educational services is, of course, not a simple function of either the property or income tax base. Level of educational services may be low because taxpayers are already receiving as much educational input for their children as they are willing to pay for under existing cost conditions. If this is true, then a change from a property tax to an income tax base may shift the tax burden, but may not in the long-run change the total taxes collected in support of local education. This notion of equity for taxpayers is embodied in the supply-demand model used in this study. According to this model the large and medium counties are already contributing slightly more than supply-demand equilibrium would dictate.

Under equilibrium conditions, local expenditures in the large county would drop from $194 to $171 per pupil and in the medium county would drop from $164 to $154 per pupil. Local expenditures in the small county, however, would increase by $11 per pupil (Table 4). The level of outside help was held constant and thus similar changes are reflected in total expenditures (Table 4). Values at equilibrium do not arise solely from taxable property and income, which are only two variables in the model, but from the complex interaction of all variables specifying the supply-demand relationship. Solution of equations one to four at the observed level of exogenous variables attempts to capture the equilibrium level of this interaction.

What may be overlooked, however, is that while a supply-demand level of expenditure may be just and equitable to taxpayers, it is not necessarily equitable to children in local school systems. A more reasonable concept of equity for them may be that they have access to educational inputs equivalent to some minimum standard. While it is probably not possible to guarantee equal opportunity on all facets of the educational process, it might be possible to equalize some inputs most needed by students.

This analysis assumes that equalizing the pupil-teacher ratio (PTR), salary levels of teachers (AVSAL) and level of classroom instructional expenditures (INS) represents one minimum policy of equal opportunity. This policy will specify a level of total expenditure significantly higher than achieved under observed or equilibrium conditions. Increased expenditures for equalization would have to come either from increased local taxes or from increased state and federal spending. With a minimum standard of PTR, AVSAL and INS equal to the 1970-1971 state average and no change in state and federal spending, approximately $100 more per pupil would be required in each of the counties (column 5 compared to column 1 or 3 of Table 4). These

Table 4. LOCAL EXPENDITURES PER PUPIL IN A LARGE, MEDIUM, AND SMALL COUNTY UNDER OBSERVED CONDITIONS, EQUILIBRIUM CONDITIONS, WITH EQUALIZATION BY LOCAL LAWS, AND EQUALIZATION BY INCREASED STATE AND FEDERAL SPENDING, GEORGIA, 1970.[a]

County Size	Observed Expenditures		Equilibrium Expenditures		Equalization by Local Laws		Equalization by State and Federal Funds	
	Total	Local	Total	Local	Total	Local	Total	Local
Column	1	2	3	4	5	6	7	8
	(dollars per pupil)							
Large	492	194	469	171	586	287	586	162
Medium	494	164	485	154	594	264	594	145
Small	491	100	503	111	593	202	593	104

[a]Equalization in this context means that average pupil-teacher ratios, salary levels and classroom instructional expenditures are equal to the state average.

estimates were made by inserting average values of PTR, AVSAL, and INS into the expenditure equation (Equation Three) and assuming that local laws could be passed that would raise the required increase in taxes from local sources. In light of the estimated equilibrium for taxpayers (columns 3 and 4 of Table 4), it is unlikely that they would raise taxes unless such local laws are required by state and federal policies as a prerequisite for receiving outside help.

A more probable policy is that funds for equalization would come from state and federal sources. However, one unfortunate side effect of increased state and federal funding is its depressing effect on local effort. In Equation Two of the equilibrium model the coefficient of state and federal aid is negative. Thus, as more outside money comes in, local effort diminishes and this results in an estimated equilibrium in which local expenditures are about 10 dollars per pupil lower than they would be without equalization by outside funds (columns 4 and 8 of Table 4).

SUMMARY AND CONCLUSIONS

A model of supply and demand for public education at the local level was used to analyze taxpayer and pupil equity. In the three Georgia counties examined, the actual and equilibrium levels of local expenditures per pupil were fairly close, within $10 of each other. However, the distribution of property taxes revealed that this tax was highly regressive. In each of the counties the level of local and total expenditures was significantly less, about $100 than what might be considered equitable from the point of view of the school child seeking equal opportunity. Raising the additional funds entirely by state and federal aid has the undesirable effect of reducing local effort. Raising additional funds by a state and federal policy that would require new local tax laws as a prerequisite for aid is probably not politically feasible. A remaining option to be explored is whether taxpayer equity would be closer to school child equity if the tax base were different.

The mechanism for achieving equilibrium in the supply-demand model is the voting and associated political process. The logic of voters and taxpayers has dealt in the past with decisions about the incidence of a very regressive property tax. For example, in counties with a majority of low-income families, the voters will be reluctant to increase a regressive tax such as the property tax. The demand for education, as expressed by taxpayers, could conceivably be higher in these counties under a progressive income tax system that would shift the current burden from low to high income earners. If this is true, introducing the income tax as a method to raise additional funds could be a more desirable method of reconciling taxpayer and school child equity than any existing alternative.

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