The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis

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The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis

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The purpose of this paper is to present some empirical findings on a problem for which we presently possess only the scantest of evidence: the effects of local public budgets on property values in the community. There do exist several studies of the incidence of property taxes, the mainstay of local revenue systems in the United States, but in nearly all cases these studies are based on assumptions concerning the degree to which the tax on various components of property is capitalized. We have, however, little hard empirical evidence indicating whether property taxes are in fact capitalized and, if so, to what extent.[1] This deficiency might not seem very serious if we had a single, compelling theory of the shifting and incidence of property taxes, a theory which suggested a definite solution to the problem. The truth, however, is that the theory of the shifting of property taxes points to a wide range of possibilities: under some circumstances the whole of the tax may be reflected in a reduced rental income (and hence lower property values) for landlords, while in other situations the tax may result primarily in increased rents to tenants, with little impact on the market value of property.

Some years ago in this journal, Tiebout (1956) developed a formal model involving consumer location in accord with preferences for local public goods and services. He suggested that at least at a theoretical level we can envision a system in which we get something resembling a market solution to the production and consumption of local public goods. Very simply, Tiebout's world is one in which the consumer "shops" among different

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[1] The paucity of empirical work on this problem is readily apparent from Netzer's survey of the evidence in his comprehensive study of the property tax (1966, chap. 3).

communities offering varying packages of local public services and selects as a residence the community which offers the tax-expenditure program best suited to his tastes. The obstacles to such consumer mobility (including job commitments and family ties) are obviously great; as a result several economists have expressed serious reservations as to the likely explanatory power of the Tiebout model. On the other hand, with the growing urbanization of society, there is some reason to believe that the Tiebout hypothesis may be relevant to the real world: individuals working in a central city frequently have a wide choice of suburban communities in which to reside, and the quality of the local public schools, for instance, may be of real importance in the choice of a community of residence. If this is true, the outputs of public services (as well as taxes) should influence the attraction of a community to potential residents and should thereby affect local property values.

The first section of this paper develops briefly the conceptual framework for examining the effects of property taxes and local expenditure programs on property values. This will provide the background for an empirical study involving fifty-three residential communities in northeastern New Jersey. The results of the study, which suggest the direction of the effects of tax and expenditure programs on local property values, together with rough estimates of orders of magnitude, have, I believe, some interesting implications for local-government finance.

Local Public Budgets and the Tiebout Model

There exists an extensive literature on the theory of the shifting of property taxes, a literature which points to the probable effects of property taxes on the value of land and structures.[2] The traditional or "classical" theory suggests (subject to numerous qualifications) that the part of the tax falling on the land would, since the income from land is a pure economic rent, be absorbed by the land owner (that is, this part of the tax would be capitalized in the form of reduced property values). In contrast, the portion of the tax applicable to structures would in the long run be "shifted" forward to purchasers, as the tax would depress the net return on investment in the construction industry and would thereby result in a diminished stock of structures in future periods.

This literature, however, deals largely with the case of a single tax rate applicable to all land and structures. If, in contrast, we consider a system (as is the case in the United States and several other countries) in which localities have varying tax rates and offer differing levels of output of public services, a quite different approach and set of conclusions suggest

[2] For an excellent critical survey of the theories of the shifting and incidence of the property tax, see Simon (1943).

themselves. In terms of the Tiebout model, we can conceive of a utility-maximizing consumer who weighs the benefits stemming from the program of local public services against the cost of his tax liability and chooses as a residence that locality which provides him with the greatest surplus of benefits over costs. From this standpoint, the individual's tax liability (that is, the value of his house and lot multiplied by the property tax rate) becomes the price of entry into the community, the price of consuming the local output of public services. It is the present value of the future stream of benefits from the public services *relative* to the present value of future tax payments that is in this case important.

This general-equilibrium approach to the problem implies that, if a community increases its property tax rate in order to expand its output of public services, *net* rental income (actual or imputed) to property owners need not decline and may well increase.[3] Moreover, this suggests a way to determine whether the Tiebout hypothesis of consumer location in accordance with preferences for local budgetary programs has any relevance to actual behavior. If consumers, in their choice of locality of residence, do consider the available program of public services, we would expect to find that, other things being equal (including tax rates), gross rents (actual or imputed) and therefore property values would be higher in a community the more attractive its package of public goods. Individual families, desiring to consume higher levels of public output, would presumably tend to bid up property values in communities with high-quality programs of public services. As Bickerdike noted, "Some things, such as lighting and cleaning of streets, are advantages visible to the eye; they may be taken into account when a man is choosing a house, though they are apt to be forgotten when the rate-collector calls" (1902, p. 476). In contrast, if local expenditure programs have no impact at all on locational decisions, we would not expect local property values to depend on spending variables, for in this case the demand and supply for local property would presumably be independent of these programs. The next section of this paper is an attempt to see if we can discern empirically the effects (or absence of effects) of local property taxes and public expenditures on local property values and, if so,

[3] A superb treatment of the incidence of property taxes is to be found in appendix G of Marshall's *Principles of Economics* (1948). Marshall is careful to distinguish between the case of a national property tax and a system of local taxes on property. Contrasting "onerous rates" (those which yield no compensating benefits) with "remunerative rates" (those which confer benefits on those who pay them), Marshall argues that for local rates "onerous taxes on site values tend to be deducted from the rental which the owner, or lessee, receives: and they are accordingly deducted, in so far as they can be foreseen, from the ground rent which a builder, or anyone else, is willing to pay for a building lease. Such local rates as are remunerative, are in the long run paid by the occupier, but are no real burden to him" (1948, p. 797). Marshall notes further that "such rates [remunerative], ably and honestly administered, may confer a net benefit on those who pay them; and an increase in them may attract population and industry instead of repelling it" (1948, p. 794).

whether we can get some rough approximations concerning the relative strength of the two effects.

An Empirical Study

The study consists of a cross-sectional analysis of a sample of communities with the aim of determining, other things being equal, the relationship between property values and local property taxes and expenditures. The problem (as usual in these kinds of experiments) is that within a sample of communities other things are not equal. It therefore becomes necessary to specify the other determinants of local property values and then to attempt to hold these constant while observing the partial relationship among the variables of concern. In addition to the level of property tax rates and the output of public services, one would expect the value of residences in a particular community to depend on a number of other variables. First, within a metropolitan area, the accessibility of the community to the central city should be of importance. Since the central city is the primary source of employment in the area, individuals should, other things being equal, prefer living close to the city to minimize the cost in both time and money of traveling to their place of employment (and to make the leisure activities of the city more accessible). Therefore, *ceteris paribus*, we would expect property values to vary inversely with distance from the central city.

Second, the character of the residences themselves is an obvious determinant of value. Large houses in an excellent state of repair and in a pleasant location will tend to sell at higher prices than smaller, run-down residences in unattractive areas. For this study, I will thus assume that the value of dwellings in a particular community depends upon the physical characteristics of the residences and area, on the proximity of the community to the central city, on the property tax rate, and on the level of output of public services in the locality. The sample under study consists of a group of fifty-three municipalities in northeastern New Jersey, all of which are located within the New York metropolitan region.[4] To maintain some semblance of homogeneity, the sample is limited to "residential" communities. A residential community is defined as one with an employment-residence ratio of less than 100 (that is, a municipality in which a larger number of residents go outside the community to their place of employment than come into the community to work from other places of residence).

The next task is to locate operational measures of the variables. As an index of proximity to the central city, I have used simply the linear distance of the municipality from midtown Manhattan. The physical characteristics of the property, including the attractiveness of the neighbor-

[4] For a description of the sample of communities and of the sources of data, see the Appendixes.

hood as a place of residence, are more difficult to quantify. Some data are available on the quality of the housing stock in each community (U.S. Bureau of the Census 1963). As a measure of size, the study employs the median number of rooms per dwelling. To measure the age (and presumably to some extent the state of repair) of the housing stock, I have used as an independent variable the percentage of the houses in the community built since 1950. However, this still leaves unconsidered the various intangible characteristics of a house: its physical charm or beauty and the attractiveness of the particular neighborhood or community as a place to live. As a proxy variable for these intangibles, the study uses family income. Wealthier families will presumably select higher-quality residences—better houses in more desirable neighborhoods. The median family income of the community therefore represents a measure of the intangible features of the houses in the community.

In the choice of fiscal variables, one cannot use the nominal property tax rate because the wide variation in assessment ratios across communities implies that the actual rate at which communities tax property is not likely to bear a systematic relationship to the nominal rate. Instead, I have used the "effective" tax rate (that is, the nominal rate times the assessment ratio), which should provide a better measure of the true rate at which property is taxed in the locality.[5] The major problem in the selection of variables is determining a reasonable index of output for local public services. Those who have worked in this area are familiar with the difficulties in obtaining operational measures of output in the public sector. Frequently the only feasible proxy for public output is some measure of inputs. Per capita public expenditure immediately suggests itself; further reflection, however, suggests that this is likely to be a rather unsatisfactory measure of the level or quality of output. Public spending per capita in two communities may vary, for example, as a result of differing relative sizes of the school population; a community with a relatively large number of children will, other things being equal, have to spend more per capita to provide a school system of the same quality as another community with an older age distribution of the population. And these variations in spending may have nothing to do with the quality of public output provided.[6]

[5] Official assessment ratios for each community are determined by the state of New Jersey for use in the school-aid equalization program. These ratios are arrived at by comparing the actual prices at which individual homes in the various communities are bought and sold with the value at which these homes are assessed for tax purposes. In 1960 assessment ratios ranged all the way from 11 percent to 104 percent. In the regressions, I have used a simple average of effective tax rates for each community over the period 1956–60, which serves to smooth out any aberrations resulting from an unrepresentative sample of homes sold in a particular year. See Beck (1963, p. 44).

[6] In the actual regression runs, the coefficient of the per capita public-expenditure variable was not significantly different from zero.

By far the largest single item in local public budgets (and no doubt the most important to families with children) is primary and secondary education. Again no direct measure of output is available, but comprehensive data on inputs, more precisely on costs, are published annually. I have, as a result, used expenditure per pupil as a proxy variable for the level of output of educational services. While this is by no means a perfect variable for my purposes (in part because it neglects the noneducational public services provided locally), there is some reason to expect that, for a group of residential communities in the same section of a metropolitan area, the quality of local school systems should vary directly with expenditure per pupil.[7] If this is the case and if (as the Tiebout model suggests) individuals consider the quality of local public services in making locational decisions, we would expect to find that, other things being equal (including tax rates) across communities, an increased expenditure per pupil should result in higher property values.

Using the multiple-regression technique, my procedure was to regress the median value of owner-occupied dwellings (including house and lot) in the various communities on the median number of rooms per house, the percentage of houses constructed since 1950, median family income, the distance in miles from Manhattan, the annual expenditure per pupil in the public schools, the effective property tax rate, and the percentage of families in the community with an income of less than $3,000 per year.[8] The inclusion of the last variable, the percentage of low-income families, is necessitated by the character of the data. Poorer families are more likely to reside in rental dwellings than wealthier families in suburban com-

[7] Kiesling (1967), in a recent study of a sample of school districts in the state of New York, had only modest success with a per pupil expenditure variable in explaining the level of achievement as measured by the test scores of pupils in the sample districts. It may still be the case, however, that *perceived* benefits in terms of smaller classes, better libraries, etc., are closely related to expenditure per pupil, and that this is what counts in terms of the evaluation of different schools by parents. For purposes of determining whether individuals consider the benefits from public services in selecting a community of residence, expenditure per pupil may for this reason be a satisfactory variable. In computing expenditure per pupil, I (like Kiesling) used a weighted average of enrollments to take account of the increased cost of pupils at higher grade levels. Following Kiesling and incorporating information from New Jersey sources, I employed the following weights to determine a "weighted pupil enrollment" for each school district: kindergarten pupils = .5, elementary school pupils (grades 1–8) = 1, secondary school pupils (grades 9–12) = 1.25, special pupils (mentally retarded, etc.) = 2. Expenditure per pupil for each school district was then calculated by dividing the weighted enrollment into the annual current costs of the district. See Appendix B for data sources.

[8] The dependent variable in the analysis is the median value of single-unit, owner-occupied dwellings (including the value of both house and lot) in the community which is provided in the *1960 Census of Housing* (U.S. Bureau of the Census 1963). The value of residences is based upon appraisals by owners and may, as a result, be subject to considerable error. However, the typical or average value for residences in a municipality seems to be reasonably accurate. Kish and Lansing (1954), for example, found that the difference between the mean of appraisers' and owners' estimates for over 500 residences was only $350.

munities. In consequence, in a community with a relatively large number of low-income families, median family income will tend to understate significantly the actual median income of homeowners. And it is this latter figure which is needed for the study, since we are trying to explain the median value of owner-occupied dwellings. We would therefore expect the median value of owner-occupied houses to be higher relative to median family income in the community as a whole for those municipalities where a relatively large number of low-income families reside.

Before presenting the regressions, it is important to stress that the variation in the dependent variable, the value of owner-occupied dwellings, is likely to be quite substantial in the presence of capitalization of the tax. If, for example, we consider two identical houses in two identical communities, where both dwellings have an expected life of forty years and rent for $2,000 annually, the difference in the market value of the houses, if one were subject to a 4 percent property tax and the other to a 2 percent tax, would be in excess of $5,000 if the tax were fully capitalized.[9] As a result, we are not likely to be faced with the difficult task of isolating minute differences in property values, differences which could easily be obscured by minor imperfections in the explanatory variables.

Employing ordinary least squares (OLSQ), equation (1) indicates that, with other things constant, property values bear a significant negative relationship to the property tax rate and a significant positive association with expenditure per pupil.[10]

[9] For property of a finite life, in this case forty years, we have:

$$V = \sum_{i=1}^{40} \frac{Y_n}{(1+r)^i} = \sum_{i=1}^{40} \frac{(Y - tV)}{(1+r)^i}, \tag{N1}$$

where V = market value of the property, Y = gross annual rental income, Y_n = net (after tax) rental income, r = rate of discount. Solving for V, we get:

$$V = \frac{Y\left[\sum_{i=1}^{40} \frac{1}{(1+r)^i}\right]}{1 + t\left[\sum_{i=1}^{40} \frac{1}{(1+r)^i}\right]}. \tag{N2}$$

Using a rate of discount of 5 percent, the difference cited in the text is calculated from the expression:

$$V = \frac{\$2{,}000m}{(1 + .02m)} - \frac{\$2{,}000m}{(1 + .04m)} = \$25{,}550 - \$20{,}350 = \$5{,}200,$$

where:

$$m = \sum_{i=1}^{40} \frac{1}{(1 + .05)^i} = 17.1591.$$

[10] The tax, expenditure, and distance variables are employed in log form, which somewhat enhances their explanatory power. This would appear to make sense. As suggested by equation (N2) in the preceding footnote, we would not expect property values to vary linearly with the absolute level of the tax rate; rather, the higher the tax rate, the smaller should be the impact of a given absolute change in the rate. Similarly, we might expect that additional expenditures per pupil would tend to yield

$$V = \underset{(2.4)}{-21} - \underset{(4.1)}{3.6 \log T} + \underset{(2.1)}{3.2 \log E} - \underset{(4.8)}{1.4 \log M} + \underset{(4.1)}{1.7R} + \underset{(3.9)}{.05N} + \underset{(8.9)}{1.5Y} + \underset{(3.6)}{.3P} \quad (1)$$

[Note: The numbers in parentheses are the absolute values of the t-statistic for the coefficients. All the coefficients are statistically significant at a 5 percent level of significance.]

$$R^2 = .93,$$

where V = median home value in thousands of dollars (1960); $\log T$ = natural log of the effective percentage tax rate (the rate used is a simple average of effective rates over the years 1956–60); $\log E$ = natural log of annual current expenditures per pupil in dollars (1960–61); $\log M$ = natural log of the linear distance in miles of the community from midtown Manhattan; R = median number of rooms per owner-occupied house (1960); N = percentage of houses built since 1950 (1960); Y = median family income in thousands of dollars (1959); P = percentage of families in the community with an annual income of less than $3,000 (1959). These results thus appear to suggest some capitalization of the tax and appear consistent with the Tiebout hypothesis.

Some further thought, however, suggests good reason to be suspicious of the results in equation (1). One could make a good case for the argument that the negative association between tax rates and home values stems from a dependence of tax rates on property values (rather than the reverse). Given the level of public spending, the higher the property values in a community, the lower are the tax rates needed to generate the revenues to finance the program. A more complete model would have to include another equation in which the tax rate is treated as a dependent variable, presumably as a function of the level of local public spending, the size of the tax base, and the extent of public issues of debt (if any). Moreover, the level of spending per pupil in the local public school system probably also depends to some extent on the wealth and income in the community.

What all this means is that equation (1) may well contain some simultaneous-equation bias, since the supposed independent variables, the tax rate and expenditure per pupil, probably depend to some extent on the

successively diminishing increments of benefits. Finally, a log form for the distance variable seems reasonable, since being an additional mile from the central city would presumably be more important to someone who was quite close to the city than to an individual who was already twenty miles away. I also experimented with two other variables from the *1960 Census of Housing* (U.S. Bureau of the Census 1963), variables which one might expect to influence the value of owner-occupied houses in a community: the "homeowner vacancy rate" and the percentage of owner-occupied units deemed "sound" by the census takers. Neither variable, however, was statistically significant or had any appreciable effects on the results.

dependent variable, home values. If this is true, the coefficients of log T and log E in equation (1) will be correlated with the error term, and the results in equation (1) may be spurious. To provide a more reliable test of the capitalization and Tiebout hypotheses, I reestimated equation (1) using two-stage least squares (TSLS).[11] The TSLS version appears as equation (2).

$$V = \underset{(2.3)}{-29} - \underset{(3.1)}{3.6}\log T + \underset{(2.1)}{4.9}\log E - \underset{(4.0)}{1.3}\log M + \underset{(3.6)}{1.6}R + \underset{(3.9)}{.06}N + \underset{(7.7)}{1.5}Y + \underset{(3.1)}{.3}P \quad (2)$$

$$R^2 = .93.$$

The results in equation (2) differ little from those in equation (1) except that the coefficient on the public-expenditure variable is somewhat larger. It is interesting to try to get some idea of the orders of magnitude implied by the coefficients of the tax and expenditure variables. Equation (2) indicates that (with public output held constant) an increase in local property tax rates from 2 percent to 3 percent will reduce the market value of a house by about \$1,500.[12] Considering a typical house with a market value of \$20,000 and an expected life of forty years, and using a rate of discount of 5 percent, full capitalization of the increase in the tax would imply a reduction in value to about \$17,740.[13] Equation (2) thus suggests

[11] To "purge" the tax and expenditure variables of their correlation with the error term, it is necessary to derive "predicted" tax and spending variables by regressing log T and log E on the other independent variables in equation (1) and on some additional predetermined variables. These new predicted variables are then used to reestimate equation (1). On this procedure, see, for example, Johnston (1963, chap. 9). The additional predetermined variables employed in generating the new tax and expenditure variables were: the median number of years of school completed by males of age twenty-five or more, population density, percentage of dwellings owner-occupied, the percentage of change in population from 1950 to 1960, the percentage of the population enrolled in public elementary and secondary schools, a dummy variable with a value of one for those communities in Hudson County and a value of zero for municipalities in other counties, and the value of commercial and industrial property per resident. In the complete model, these variables would appear as exogenous variables in other equations which determine the levels of tax rates and public expenditures.

[12] The mean value of the effective property tax rate for the sample of communities is 2.4 percent.

[13] The capitalized value of the house is calculated with the use of equation (N2) in footnote 9. The first step is to employ equation (N2) to determine the value of the annual rent, Y:

$$\$20{,}000 = \frac{Ym}{1 + .02m} \quad \text{yields} \quad Y = \$1{,}566, \qquad \text{(N3)}$$

where

$$m = \sum_{i=1}^{40} \frac{1}{(1 + .05)^i} = 17.1591.$$

(Continued)

that a substantial portion of the tax increase, approximately two-thirds (that is, \$1,500/\$2,260) in this case, is being capitalized in the form of depressed property values.[14]

In addition, by assuming typical values of the variables, it is possible to get some feeling for the relative strength of the tax and expenditure variables. For this purpose, consider the following experiment. Assume that the community is composed of identical homes, each worth \$20,000 and each housing one public school pupil. Assume next that the community decides to raise its effective property tax rate from 2 percent to 3 percent to provide a balanced expansion in spending on all locally provided services. Since roughly half of the local public budget goes into education, this implies that expenditure per pupil in the school system will rise by \$100 (that is, \$20,000 [.01/2]). Again using typical values of the variables, assume that this allows spending per pupil to rise from \$350 per annum to \$450. Plugging these values into equation (2), one finds that the impact of the tax increase is to reduce the value of each house by \$1,500. On the other hand, the increase in expenditure per pupil from \$350 to \$450 pushes house values up by roughly \$1,200. Equation (2) thus suggests that the half of the budget increase going into the school system almost in itself offsets the depressive effects of the higher taxes on home values. This makes no allowance for the presumed positive impact on property values of the improved quality of other locally provided services. If we had considered a rise in tax rates for the sole purpose of improving the quality of the school system, equation (2) would (for average values of the variables) suggest that the effect on property values of the benefits from the improved services would more than offset the depressive influence of higher property taxes. The evidence therefore suggests that the benefits forthcoming from the primary service provided by local government, the public school system, do in fact exert a positive influence on local property values; better schools, other things being equal, appear to enhance the value of

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Then, using this equation again with the computed value of Y and a tax rate of 3 percent, we find the value to be:

$$V = \frac{\$1{,}566m}{1 + .03m} = \$17{,}739.$$

The mean value of an owner-occupied house in the sample is \$19,200.

[14] Ridker and Henning (1967) have recently studied the determination of residential property values in the St. Louis metropolitan area. Using 1960 census data, they find important some of the same variables I have used in this study. Although they did not employ any property-tax or public-spending variables, the authors did include a dummy variable to distinguish between census tracts in Illinois and Missouri. Property taxes are significantly higher in Illinois than in Missouri, and Ridker and Henning found that, other things being equal, property in the St. Louis metropolitan area is of higher value if it is located in Missouri rather than in Illinois. Their results thus also suggest some capitalization of local property taxes.

local residential property. One clearly should not place too much stock in the precise outcome of the example just considered; rather, the results should be regarded as indicating no more than orders of magnitude. In this light, equation (2) suggests that the impact of increased benefits on property values from an expansion in spending on the local school system approximately offsets the depressive effects of the higher taxes required to finance the expanded program. If property values do provide a reasonably accurate reflection of the benefits from local public services, these results would seem to suggest that these communities have, on the average, expanded public spending to the point where (very roughly) the benefits from an additional unit of output equal marginal cost.

While the benefits from better schools may cancel out the effects on residential property values of higher taxes, equation (2) does imply that increases in property tax rates *unaccompanied* by an expanded program of public services will depress local property values. This is important for comparing the effects of property taxes across communities; it means, for example, that if one community (because of houses of lower value or as a result of a relatively large population of children) levies higher tax rates than a neighboring municipality in order to provide the *same* quality of public services, property values in the former community will be depressed relative to those in the adjacent community where tax rates are lower. Consumers thus appear to some extent to "shop" for public services. If one community can provide a given program of public services more "cheaply" (that is, with lower tax *rates*) than another, at least some individuals appear willing to pay more to live there.

Before concluding this study, I should comment briefly on some problems inherent in the approach adopted and on deficiencies in the available data. Most studies of the effects of taxes (for example, the shifting of the corporation income tax) have relied upon time-series data to isolate the effects over time on relevant variables of changes in tax rates. In contrast, I have in this paper adopted cross-sectional techniques. This latter approach would appear best suited to the problem under investigation: we are asking what effect a change in tax rates and/or expenditures has on the equilibrium value of residential property. The problem is thus one of comparative statics for which cross-sectional estimation is the appropriate technique. Implicit in the use of cross-sectional regression analysis is the assumption that the observations do in fact represent points of equilibrium. This, of course, is seldom if ever strictly true and, especially where an adjustment period of some length is likely, it is possible that the results may be distorted to some extent (Kuh 1959; Grunfeld 1961). It could be, for example, that the negative association we have observed between property taxes and home values is primarily a short-run phenomenon, which would disappear over a longer period of time. Unfortunately, there are not available time-series data to investigate the nature of the

adjustment process. Ultimately, however, time-series studies of the adjustment process would provide a valuable supplement to cross-sectional studies of the effects of local taxes.

Finally, I should recognize explicitly (as the reader no doubt already has) the imprecision of several of the operational measures of the variables. This, along with the problems inherent in the use of simultaneous-equation estimation techniques, suggests that some caution is in order concerning the degree of reliability that we can attribute to the results.

Summary and Conclusions

This paper reports the findings of a cross-sectional study of the effects of local property taxes and local expenditure programs on property values. Using the two-stage least-squares estimation technique in an attempt to circumvent the likely presence of some simultaneous-equation bias, the regression equation indicates that local property values bear a significant negative relationship to the effective tax rate and a significant positive correlation with expenditure per pupil in the public schools. The size of the coefficients suggests that, for an increase in property taxes unaccompanied by an increase in the output of local public services, the bulk of the rise in taxes will be capitalized in the form of reduced property values. On the other hand, if a community increases its tax rates and employs the receipts to improve its school system, the coefficients indicate that the increased benefits from the expenditure side of the budget will roughly offset (or perhaps even more than offset) the depressive effect of the higher tax rates on local property values.

These results appear consistent with a model of the Tiebout variety in which rational consumers weigh (to some extent at least) the benefits from local public services against the cost of their tax liability in choosing a community of residence: people do appear willing to pay more to live in a community which provides a high-quality program of public services (or in a community which provides the same program of public services with lower tax rates).

Appendix A

Notes on the Sample of Communities

The group of communities used in the empirical study consists of all residential New Jersey municipalities of population size 10,000–50,000 (according to the 1960 Census of Population) in the New York metropolitan region with the exception of those in Monmouth County. This county was omitted from the outset because it includes a large number of beach-resort communities with seasonal residences. For a definition of the New York metropolitan region, see Hoover and Vernon (1962, p. 8). By residential community is meant a municipality with an employment-residence ratio of less than 100 according to *The Municipal Year Book 1963* (1963, table 3). This procedure produced a group of

fifty-three municipalities which were included in the study and are listed below.

Bergen County
Bergenfield
Cliffside Park
Dumont
East Paterson
Fair Lawn
Fort Lee
Garfield
Glen Rock
Hasbrouck Heights
Lodi
Lyndhurst
Maywood
New Milford
North Arlington
Palisades Park
Ridgefield Park
Ridgewood
River Edge
Rutherford
Teaneck
Tenafly
Waldwick

Essex County
Maplewood
Millburn
Montclair
Nutley
Orange
South Orange
Verona
West Orange

Hudson County
Secaucus
Weehawken
West New York

Middlesex County
Edison
Highland Park
Metuchen
Middlesex
South Plainfield
South River

Morris County
Madison
Parsippany-Troy Hills

Passaic County
Hawthorne
Totowa
Wayne

Somerset County
Bound Brook
North Plainfield
Somerville

Union County
Cranford
New Providence
Roselle
Roselle Park
Summit
Westfield

Appendix B

Sources of Data

The sources of data for the variables used in the estimations are as follows:

Variable	Source
1. Median value of owner-occupied dwellings	Census of Housing, 1960
2. Median number of rooms per owner-occupied dwelling	Census of Housing, 1960
3. Population	Census of Population, 1960
4. Median number of years of school completed by males of age twenty-five and over	Census of Population, 1960
5. Effective property tax rates	Beck (1963)
6. Value of commercial and industrial property per resident	Beck (1963)
7. Population density	Beck (1963)
8. Median family income	Beck (1963)
9. Percentage of dwellings built since 1950	*Municipal Yearbook, 1963*
10. Percentage of dwellings owner-occupied	*Municipal Yearbook, 1963*

VARIABLE	SOURCE
11. Percentage of population with family incomes under $3,000 .	*Municipal Yearbook, 1963*
12. Percentage change in population from 1950 to 1960	*Municipal Yearbook, 1963*
13. Linear distance in miles from mid-town Manhattan (that is, Fifth Avenue and 34th Street) . . .	Measured in *Rand McNally Road Atlas*, 43d ed. (1967)
14. Municipal expenditure data . . .	*Twenty-Third Annual Report of the Division of Local Government*, State of New Jersey, 1960
15. School district enrollment and expenditure data	*Tenth Annual Report of the Commission of Education, Financial Statistics of School Districts*, School Year 1960–61, State of New Jersey

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