

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Fiscal Federalism: Quantitative Studies

Volume Author/Editor: Harvey S. Rosen, ed.

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-72619-3

Volume URL: <http://www.nber.org/books/rose88-1>

Publication Date: 1988

Chapter Title: Tax Deductibility and Municipal Budget Structure

Chapter Author: Douglas Holtz-Eakin, Harvey S . Rosen

Chapter URL: <http://www.nber.org/chapters/c7885>

Chapter pages in book: (p. 107 - 136)

---

# Tax Deductibility and Municipal Budget Structure

Douglas Holtz-Eakin and Harvey S. Rosen

## 4.1 Introduction

Historically, federal tax law has allowed itemizers to deduct state and local property, income, and general sales taxes on their personal income tax returns. This provision is estimated to have decreased federal tax revenues by about \$30.8 billion in 1985. (Executive Office of the President 1986, G-42). The last several years have witnessed a serious public debate about the merits of partially or totally eliminating state and local tax deductibility. The U.S. Treasury recommended complete abolition of deductibility in 1984, as did President Reagan in 1985.<sup>1</sup> The Tax Reform Act of 1986 disallowed state sales tax deductions, but continued those for income and property taxes. More changes in the tax code are likely in the next few years, and state and local tax deductibility is likely to remain a controversial issue.

Those who favor deductibility argue that its elimination would have a disastrous impact on state and local public finance.<sup>2</sup> In this view, if people cannot deduct state and local taxes on their federal tax returns, then state and local government goods and services in effect become more expensive, and the demand for them declines. State and local public officials appear to believe this scenario. When the United States Conference of Mayors convened in 1985, the *New York Times* reported

Douglas Holtz-Eakin is assistant professor of economics at Columbia University and a research economist at the National Bureau of Economic Research. Harvey S. Rosen is professor of economics at Princeton University and a research associate at the National Bureau of Economic Research.

We have received useful comments from participants at seminars at SUNY Stony Brook and the University of Maryland. We are grateful to Ronald Fisher for his suggestions, to Dan Edelstein for assistance with the computations, and to NSF Grant No. SES-8419238 for financial support. This study is part of the National Bureau of Economic Research Project in State and Local Government Finance.

that the meeting “ended with an unusual display of bipartisan unanimity: only one ‘no’ vote was audible on a resolution urging Congress to amend the [president’s] tax plan to keep deductibility of state and local taxes.”<sup>3</sup>

This very simple story about the impact of deductibility ignores the fact that subfederal governments have access to nondeductible sources of revenue, such as user charges, license fees, special assessments, etc. It could be that eliminating deductibility would lead only to the substitution of nondeductible for deductible revenue sources, and have no impact on spending. However, econometric studies by Inman (1985), Hettich and Winer (1984), and Noto and Zimmerman (1984) find that a jurisdiction’s choice of revenue instruments is not responsive to its “tax price”: the effective cost of a dollar of expenditure taking into account federal deductibility. Recently, Feldstein and Metcalf (1986) challenged this result, arguing that these studies employed inappropriate data, incorrect tax price measures, and/or inconsistent econometric techniques. Their examination of 1980 data suggested that if deductibility were removed (1) state and local use of deductible taxes would decline, (2) use of other revenue sources would increase, and (3) net expenditures from local funds would stay about the same. Moreover, because some of the revenue sources that are nondeductible to individuals *are* deductible to businesses, eliminating deductibility on personal tax returns would not increase federal revenues as much as one would expect if one ignored revenue instrument substitution effects. Indeed, federal tax collections might even decrease. Unfortunately, the regression coefficients which form the basis for all these conclusions are estimated imprecisely in the sense that the coefficients are small relative to their standard errors.

At the moment, then, economists’ understanding of the empirical impact of deductibility seems to be a bit murky. In this paper we present new evidence based on a rich set of data which tracks the fiscal behavior of 172 local governments from 1978 to 1980. Our goal is to find the effects of deductibility on the mix between deductible and nondeductible revenue sources, and on expenditures. The use of panel data allows us to control for the existence of “individual effects” in our equations for the various fiscal spending decisions, and hence to obtain more convincing estimates of the effects of deductibility. Our main findings are that (1) the elasticity of deductible taxes with respect to their tax price is in the range of  $-1.2$  to  $-1.6$ ; (2) the tax price has no statistically significant effect on the use of nondeductible revenue sources; and (3) the elasticity of local expenditures with respect to the tax price is about  $-1.8$ .

The estimating models are specified in section 4.2. Section 4.3 describes the data. Section 4.4 discusses the econometric issues and presents the results. Section 4.5 concludes with a summary.

## 4.2 The Model

### 4.2.1. Preliminaries

Analysis of the effects of deductibility on community decision making is complicated by the fact that it leads to different voters having different effective prices for local public spending. For a nonitemizer, the effective price of a dollar of local spending is just a dollar. For an itemizer, the effective price is one minus the marginal tax rate, and among itemizers, marginal tax rates differ across people. Which tax price is relevant for understanding community decisions?

One possible approach is to appeal to the median voter model, and argue that the median of the community's tax prices is the relevant figure. However, the person with the median tax price is not necessarily the person with the median demand for public goods. More fundamentally, the median voter model has a number of well-known deficiencies—it ignores such potentially important effects on fiscal decisions as logrolling, coalition formation, and bureaucratic power. (See Inman forthcoming.)

In the absence of a generally accepted model of community decision making to serve as a framework for our analysis, some sensible and convenient ad hoc formulation is required. We follow Feldstein and Metcalf and assume that the community's decision depends upon its average tax price. That is, if the average marginal federal tax rate for itemizers is  $\tau$  and the proportion of itemizers is  $m$ , then we assume that the price that is relevant for community decision making is  $(1 - m)1 + m(1 - \tau)$ .<sup>4</sup>

### 4.2.2 Estimating Equations

#### *The Basic Model*

Our goal is to estimate the impact of the tax price on a community's deductible taxes per capita ( $T_D$ ), nondeductible own sources of revenue per capita ( $T_N$ ), and expenditures per capita, ( $E$ ). Earlier empirical work suggests that each of these variables will depend upon the community's tax price ( $P$ ), family income ( $Y$ ), and other economic and demographic variables that might affect the community's budget constraint and/or preferences (a  $k$ -dimensional vector  $\mathbf{X}$ ). Employing the convenient constant elasticity specification, the estimating equation for (say)  $T_D$  is

$$(1) \quad \ln T_{Dit} = \alpha_0 + \alpha_1 \ln P_{it} + \alpha_2 \ln Y_{it} + \sum_{j=1}^k \alpha_{2+j} \mathbf{X}_{jit} + f_i + \mu_{it},$$

where  $i$  indexes communities,  $t$  indexes years, the  $\alpha$ 's are parameters,  $\mu_{it}$  is a random error term, and  $f_i$  is an "individual effect" for community  $i$ —a composite of those characteristics of the community that affect its fiscal decisions and do not change over time. (Examples might be

“political make-up,” climate, etc.)<sup>5</sup> Importantly, it is quite likely that  $f_i$  is correlated with the right-hand-side variables, with the result that an *OLS* regression leads to inconsistent estimates of the parameters. The equations for  $\ln T_{Nit}$  and  $\ln E_{it}$  take the same form.

In order to estimate equation (4.1), take first differences in order to eliminate  $f_i$ :

$$(2) \quad \ln T_{Dit} - \ln T_{Dit-1} = \alpha_1(\ln P_{it} - \ln P_{it-1}) \\ + \alpha_2(\ln Y_{it} - \ln Y_{it-1}) + \sum_{j=1}^k \alpha_{2+j}(\mathbf{X}_{jit} - \mathbf{X}_{jit-1}) \\ + (\mu_{it} - \mu_{it-1}).$$

Again, the equations for  $(\ln T_{Nit} - \ln T_{Nit-1})$  and  $(\ln E_{it} - \ln E_{it-1})$  take the same form.

The first problem one faces in implementing this framework is construction of the average tax price. It would clearly be desirable to compute  $P$  separately for each community on the basis of its taxable income. However, data limitations make it difficult to do this in a convincing way.<sup>6</sup> Instead, we form  $P$  using data for the state in which the community is located. Specifically, denote by  $P_{it}^s$  the statewide average tax price of the state in which community  $i$  is located. Suppose that the discrepancy between  $P_{it}^s$  and  $P_{it}$  depends on the differences between the community's values of certain variables and their statewide counterparts. For example, if a community's income exceeds state income, we expect that its tax price will be lower, *ceteris paribus*. Similarly, a community with a homeownership rate higher than the state average will have a lower tax price, *ceteris paribus*. Suppose that we denote all variables that affect the tax price in this way by an  $n$ -dimensional vector  $\mathbf{z}$ . Then we can write

$$(3) \quad \ln P_{it} = \ln P_{it}^s + \sum_{j=1}^n \gamma_j (\mathbf{z}_{jit} - \mathbf{z}_{jit}^s) + g_i,$$

where the superscript  $s$  indicates a statewide value, and  $g_i$  is an individual effect.

Recall now that our basic estimating equation is in first differences. Therefore, when  $(\mathbf{z}_{jit} - \mathbf{z}_{jit}^s)$  does not change much over time, its effect on the tax price can be ignored. This is likely to be true of most candidates for inclusion in the  $\mathbf{z}$  vector. For example, one does not expect the difference between a community's proportion of homeowners and the statewide average to change much from year to year. We assume that income is the only variable in the  $\mathbf{z}$  vector for which the difference between state and community values might change substantially over time. Under this condition, taking first differences of equation (3) yields

$$(4) \quad \ln P_{it} - \ln P_{it-1} = (\ln P_{it}^s - \ln P_{it-1}^s) \\ + \gamma_1 \times [(\ln Y_{it} - \ln Y_{it}^s) - (\ln Y_{it-1} - \ln Y_{it-1}^s)],$$

where  $Y_{it}^s$  is per capita income in community  $i$ 's state during year  $t$ . Provided that the tax price goes down as income goes up, we expect  $\gamma_1 < 0$ . Substituting into equation (2) gives us

$$(5) \quad \ln T_{Dit} - \ln T_{Dit-1} = \alpha_1(\ln P_{it}^s - \ln P_{it-1}^s) + (\alpha_2 + \alpha_1\gamma_1) \\ \times (\ln Y_{it} - \ln Y_{it-1}) + \sum_{j=1}^k \alpha_{2+j}(\mathbf{X}_{jit} - \mathbf{X}_{jit-1}) \\ - \alpha_1\gamma_1(\ln Y_{it}^s - \ln Y_{it-1}^s) + (\mu_{it} - \mu_{it-1}).$$

The same logic can be applied to the estimating equations for  $(\ln T_{Nit} - \ln T_{Nit-1})$  and  $(\ln E_t - \ln E_{t-1})$ .

In short, our use of the state tax price to “proxy” for the community tax price requires that we include state income on the right side of each equation. In doing so, notice that each of the three equations— $\ln T_D$ ,  $\ln T_N$ ,  $\ln E$ —incorporates equation (4). As a result, the system of equations is subject to a nonlinear constraint: the ratio of the coefficient on (the change in) state income to the coefficient on (the change in) the tax price is identical in all three equations. In the empirical work below, we test this constraint as a check on our specification of the estimating equations.

Another issue related to  $P_{it}$  is its possible endogeneity. Imagine that community  $i$  has an unexpectedly high preference for using deductible sources of revenue, i.e., a positive  $\mu_{it}$ . This positive  $\mu_{it}$  will be associated with a relatively high propensity to itemize in community  $i$ , and, conditional on itemizing, with a relatively low federal marginal tax rate. Both of these tendencies will affect the value of  $P_{it}$ . Hence, there is probably some correlation between  $P_{it}$  and  $\mu_{it}$ . When estimating the parameters from a single cross section of data, this may be quite a serious problem. However, its severity is likely to be attenuated in an individual-effects model. This is because the presence of  $f_i$  in (1) better controls for the unobserved preferences determining the left-hand-side variables. Still, some correlation between the price variable and the error term may remain, so we employ an instrumental variables estimation technique, as described below.

We now turn to the variables in the  $\mathbf{X}$ -vector. These include:

*SHARE* = state government spending as a percentage of the state and local total for that state

*GRANTS* = sum of federal and state grants, per capita

*ASSETS* = per capita market value at the beginning of the fiscal year of holdings of federal securities, mortgages, bonds, cash, sinking funds, bond funds, etc.

*DEBTS* = market value of outstanding long and short-term debt per capita

*POP* = population

The inclusion of most of these variables is routine, but a few require some comment. The presence of the *SHARE* variable is in response to the fact that states differ in the division of taxing and expenditure decisions between states and communities. *SHARE* is a simple way, suggested by Oates (1975), of controlling for such institutional differences. The *ASSETS* and *DEBTS* variables are present to allow for intertemporal aspects of community decision making. Communities can finance current expenditures by drawing down their assets or by borrowing, even though these activities are sometimes subject to institutional constraints.

#### *Alternative Specifications.*

We also consider a number of departures from the basic model. The purposes of analyzing these variants are to assess the robustness of our results, and to facilitate comparisons with earlier work.

First, we estimated a group of regressions leaving out the *ASSETS*, *GRANTS*, and *DEBTS* variables from the right-hand side. Feldstein and Metcalf excluded these variables from their models. Doing likewise can help us determine whether discrepancies between our substantive results and theirs depends on this difference in specification.

A second set of variations is suggested by the fact that most of the earlier work on the impact of deductibility on local public finance has used single cross sections rather than panel data. Our individual effects model analyzes the *changes* in budget structure in response to *changes* in the tax price. This corresponds more closely to the proposed policy intervention than cross-community variation. Nevertheless, it is interesting to compare the results when the same data are used to estimate both an individual effects model and a series of cross-sectional models. Of course, in cross-sectional models one must include slow changing factors that are differenced out of the individual effects specification. Accordingly, we augment the  $\mathbf{X}$  vector with a number of such variables:

*PUPILS* = individuals aged 3 and older enrolled in school, per capita

*POOR* = individuals below the poverty line, per capita

*OLD* = individuals aged 65 and above, per capita

*OWN* = proportion of occupied housing units that are owner occupied

*NONWHITE* = proportion of population that is not white

PCT810, PCT1015, PCT1525, PCT25 = proportion of families with incomes in the ranges \$8,000–\$9,999; \$10,000–\$14,999; \$15,000–\$24,999; and above \$25,000, respectively

### 4.2.3 Localities vs. States as Observations

In all the models we estimate, the observations are individual localities. In contrast, Feldstein and Metcalf employ state and local totals by state.<sup>7</sup> Thus, while one of our observations is Bridgeport, Connecticut, they would use the sum of all communities in Connecticut plus the state government itself. Feldstein and Metcalf argue emphatically that analyzing community budgets is not a good way to learn about the effects of deductibility. They note that the division of taxing and spending responsibilities between state and local governments varies enormously among the states. Moreover, some communities are under institutional constraints with respect to the kind of tax instruments they can employ. Finally, they observe that it is virtually impossible to get good tax price data on a community level.

It seems to us that Feldstein and Metcalf overstate their case. To be sure, some communities may be legally constrained in their choice of tax instruments, but within these constraints, there may be scope for choice between deductible and nondeductible revenue sources. In any case, to the extent that these constraints can be viewed as individual effects, our econometric procedure controls for them. Similarly, we can control at least crudely for across state differences in the state-local division of responsibilities by including our *SHARE* variable, the share of state expenditures in the state and local total.

As noted above, we agree with Feldstein and Metcalf that the inability to compute a tax price for each community is a major problem. However, their procedure does not really solve this problem; in effect they circumvent it by assuming that the state and all localities make their decisions on the basis of the statewide average tax price. This does not seem too much different from our procedure of approximating the community tax price as the state tax price plus a correction factor.

Lest this all sound too defensive, we should emphasize that there are several real advantages to using local data. First, communities and states do not act in concert to set state and local totals; rather, the totals are the aggregate of each jurisdiction's decisions. What one gets by lumping all communities together and then combining them with the state government is unclear. In short, the underlying model purports to describe the behavior of decision-making units; these units are the jurisdictions themselves. A second advantage of using local data is that there are a lot of communities, and they differ substantially in their fiscal practices. As an econometric matter, greater sample size and variation are aids to obtaining precise parameter estimates.

We conclude that neither type of data is obviously superior. They both have advantages and disadvantages. We view analyses of the two types of data as complementary—each can shed light on the problem.



### 4.3 Data

Our budgetary data<sup>8</sup> are drawn from the *Census of Governments* for 1977 and the *Annual Survey of Governments* for 1976 and 1978–1980. A random sample of municipal governments was selected from the data tape for 1979 (the year with the least coverage), and these same governments were selected for the remaining years when possible.<sup>9</sup> There was usable information on 172 municipal governments.

In each year the record for each government contains information on revenues, expenditures, assets, debts, and grant receipts. Par values of all outstanding debt and holdings of financial assets are converted to market values using the indices provided by Eisner and Pieper (1984). Finally, budgetary variables are converted to real dollars using a region-specific CPI and then deflated to per capita terms.

We divide real per capita revenues into deductible taxes and non-deductible revenues. The former is composed of (with means in parentheses) property taxes (\$281.76), sales taxes (\$12.62), and income taxes (\$3.69). Clearly the property tax is dominant. Indeed, of the 172 governments in the sample, only 39 used a general sales tax, 37 used a selective sales tax, and only 3 had an income tax.<sup>10</sup> Unfortunately, the census data do not allow us to distinguish between property taxes from residential and nonresidential sources; the implications of this problem are discussed in section 4.4 below.

Nondeductible revenues are simply the difference between total revenues from own sources and deductible taxes. These revenues display considerable diversity in the sample, but all communities rely heavily on taxes and charges for water supply, utilities, and sewerage and sanitation. The mean per capita value of nondeductible revenue sources was \$187.28.

As noted above, each community's tax price is assumed to be a function of the tax price of its state. The latter is calculated in the following fashion. For each state in every year under consideration, the average taxable income per itemized return is computed from the IRS's *Statistics of Income* and the corresponding marginal federal income tax rate ( $\tau$ ) determined. In addition, the proportion ( $m$ ) of itemized returns for each state is calculated. The state's tax price,  $P^s$ , is then  $P^s = (1 - m) + m(1 - \tau)$ .<sup>11</sup>

Population characteristics such as the proportion of homeowners, proportion below the poverty line, etc., are taken from the *County and City Data Book* for 1983, which contains data for 1980. Because these variables change relatively slowly, we use the 1980 values in the cross-sectional regressions for 1978 and 1979 as well. In some cases, data for a municipality were not available from the *County and City Data*

*Book.* In these cases, data for the county in which the municipality is located are used.

The final data issue is the measurement of income. Yearly observations, needed to complete the panel data set, are not available from census sources. Instead, we use median family "effective buying income" taken from *Sales Management* magazine as published in the annual *Survey of Buying Power*. In effect, this variable is the predicted value of a hedonic disposable income equation based on the characteristics of the area. Data on the income distribution within each community are taken from the same source. Because "effective buying income" is a disposable income concept, it does not conform exactly to the census measure of income used by Feldstein and Metcalf. Nonetheless, it is quite similar. For 1980 (when both are available), the simple correlation between this measure and census median family income is 0.828; the correlation with census per capita income is 0.772.

Table 4.1 lists the means of each variable for 1980. The figures indicate that our communities relied more on deductible than nondeductible forms of revenue; the difference between the means of  $\ln T_D$

**Table 4.1** Means of Variables in 1980

$\ln T_D$	5.443 (0.609)	<i>OLD</i>	0.128 (0.0247)
$\ln T_N$	4.936 (1.147)	<i>OWN</i>	0.561 (0.147)
$\ln E$	6.564 (0.382)	<i>PCT810</i>	5.221 (1.455)
$\ln P^*$	-0.110 (0.0287)	<i>PCT1015</i>	14.312 (3.216)
$\ln GRANTS$	5.345 (0.543)	<i>PCT1525</i>	29.58 (3.522)
$\ln Y$	9.542 (0.218)	<i>PCT25</i>	30.58 (11.33)
$\ln ASSETS$	4.811 (1.003)	<i>POOR</i>	0.126 (0.0512)
$\ln DEBT$	5.930 (0.591)	$\ln POP$	10.58 (1.15)
$\ln PUPILS$	-1.319 (0.134)		
<i>SHARE</i>	45.59 (6.315)		
<i>NONWHITE</i>	0.139 (0.164)		

*Note:* Standard deviations of each variable are in parentheses.

and  $\ln T_N$  was 0.507. The other general feature worth noting is the large amount of across community variation. The standard deviations of the logarithms imply large variations in the levels.

Table 4.2 shows the means of the first differences of the variables during 1978–1980. During this period, in real terms collections of deductible taxes per capita fell by about 4.7 percent annually, while non-deductible revenue sources increased by about 1.7 percent a year. Real expenditures per capita fell about 1.8 percent annually. Note, however, the relatively large standard deviations. As in the case of the figures reported in Table 4.1, there is substantial variability across jurisdictions, so one must be cautious in thinking about the mean values as being “typical.”

**Table 4.2** Means of the First Differences, 1978–1980\*

$\ln T_{Dt} - \ln T_{Dt-1}$	-0.0473 (0.130)
$\ln T_{Nt} - \ln T_{Nt-1}$	0.0165 (0.281)
$\ln E_t - \ln E_{t-1}$	-0.0181 (0.164)
$\ln P_t^s - \ln P_{t-1}^s$	-0.0119 (0.0184)
$\ln GRANTS_t - \ln GRANTS_{t-1}$	-0.0286 (0.327)
$\ln Y_t - \ln Y_{t-1}$	-0.0156 (0.0393)
$\ln ASSETS_t - \ln ASSETS_{t-1}$	-0.0710 (0.585)
$\ln DEBT_t - \ln DEBT_{t-1}$	-0.105 (0.280)
$SHARE_t - SHARE_{t-1}$	1.131 (1.792)
$\ln POP_t - \ln POP_{t-1}$	0.00068 (0.04229)

\*Standard deviations of each variable are in parentheses.

## 4.4 Estimating the Model

### 4.4.1 Econometric Issues

There are several general issues in estimation. First is the potential endogeneity of the tax price. As noted above, there are good reasons to believe that in a cross-sectional regression the tax price will be correlated with the error term. Similarly, it has long been recognized that grant receipts are endogenously determined. In the individual effects model, the correlation between the tax price term and the error

is likely to be less pronounced because one controls for the potential presence of unobserved taste differences. Still, such a correlation remains a possibility, and we therefore use lagged values of the changes in the tax price and grants as instrumental variables. Note that although we start out with five years of data, one is used up because of differencing, and another because lagged variables are used as instrumental variables. Hence, our estimates are based on three years, or equivalently, two first differences.

A second econometric issue is that the error terms may be heteroskedastic. To check this, in each case we compute White's (1980) heteroskedasticity test. In no case is there even weak evidence of heteroskedasticity. As pointed out in White (1982), this test is biased toward rejection of homoskedasticity in the instrumental variables context, so the failure to reject is even more striking.

A final issue is a measurement problem associated with the dependent variable in the deductible taxes equation. Only *residential* property taxes are deductible on personal tax returns, and, hence, belong in  $T_D$ . As noted above, the census data used do not permit us to identify residential versus nonresidential property taxes. To gauge the impact of this, notice that the log of residential property taxes ( $T_R$ ) is related to the log of total property taxes ( $T_P$ ) by the identity:  $\ln T_{Rit} = \ln \psi_{it} + \ln T_{Pit}$ , where  $\psi_{it}$  is the ratio of residential to total property taxes. Viewed in this way, and ignoring income and sales taxes,<sup>12</sup> the error term in our equation for  $T_{Dit}$  contains the component  $\ln \psi_{it}$ .

If  $\psi_{it}$  is time invariant, no problem arises. However,  $\psi_{it}$  may fall as the tax price rises. This will induce a positive correlation between the tax price and the error term. Other things equal, this will bias upward (toward zero) the estimated coefficient on the tax price.<sup>13</sup> Moreover, the standard errors of our coefficients will be larger than they would have been in the absence of this measurement problem. In short, our coefficient will understate the importance of the tax price, both quantitatively and from the point of view of statistical significance. In the same way, the coefficient on the tax price in the equation for non-deductible revenues will be biased downward toward zero.

#### 4.4.2 Results

The estimates of the basic model, equation (1.5), are in Table 4.3. From the coefficient of  $(\ln P_t^y - \ln P_{t-1}^y)$  in column (1), the elasticity of deductible taxes with respect to the tax price is about  $-1.55$ . This elasticity is quite precisely estimated; the coefficient exceeds its standard error by a factor of about 3.1. In this context it is important to emphasize that the first differences specification provides a very stringent test of the importance of deductibility because it focuses on the effect of *changes* in the tax price on *changes* in deductible taxes. The

Table 4.3 Individual Effects Model: Basic Results\*

	(1)	(2)	(3)
	$\ln T_{Dt} - \ln T_{Dt-1}$	$\ln T_{Nt} - \ln T_{Nt-1}$	$\ln E_t - \ln E_{t-1}$
Intercept	-0.0940 (0.0125)	-0.0324 (0.0330)	-0.0522 (0.0171)
$\ln P_t^s - \ln P_{t-1}^s$	-1.553 (0.490)	-0.787 (1.291)	-1.833 (0.669)
$\ln Y_t - \ln Y_{t-1}$	0.00142 (0.233)	-0.495 (0.613)	0.154 (0.318)
$\ln GRANTS_t - \ln GRANTS_{t-1}$	-0.0185 (0.0613)	0.0646 (0.161)	0.0889 (0.0837)
$\ln ASSETS_t - \ln ASSETS_{t-1}$	-0.00787 (0.0118)	0.000794 (0.0310)	-0.00234 (0.0161)
$\ln DEBT_t - \ln DEBT_{t-1}$	-0.00362 (0.0284)	0.0274 (0.0747)	-0.0890 (0.0388)
$SHARE_t - SHARE_{t-1}$	-0.00345 (0.00483)	0.00820 (0.0127)	-0.00659 (0.00659)
$\ln POP_t - \ln POP_{t-1}$	-0.759 (0.155)	-0.808 (0.407)	-0.988 (0.211)
$\ln Y_t^i - \ln Y_{t-1}^i$	-1.26 (0.410)	-1.16 (1.080)	-1.649 (0.560)

\*Estimation is by instrumental variables. Numbers in parentheses are standard errors.

fact that the coefficient from the first differences specification is significant at conventional levels seems strong evidence that an effect really is present.

From the second column in Table 4.3, the elasticity of nondeductible revenues with respect to the tax price is  $-0.787$ , but it is imprecisely estimated. This is similar to Feldstein and Metcalf's finding that one cannot reject the hypothesis that the tax price has no effect on the use of nondeductible revenue sources.

The coefficient on the tax price variable in the third column of the table suggests that the impact of deductibility on local expenditures is substantial. The elasticity with respect to the tax price is  $-1.83$ , and the coefficient exceeds its standard error by a factor of 2.7. This figure is considerably larger than most estimates of individual price elasticities of demand for public goods and services. However, as Feldstein and Metcalf emphasize, it is quite possible that the aggregate response to a change in the tax price will exceed the individual response. This follows directly from the fact that any given percentage change in an itemizer's tax price produces a much smaller percentage change in the community tax price. For any observed variation in expenditure, the elasticity computed with respect to the community tax price will exceed that computed with respect to the itemizer's tax price.

Most of the other coefficients in the table are imprecisely estimated. One interesting finding is that increases in population are associated with statistically significant decreases in per capita expenditures and per capita collections of both deductible and nondeductible revenue sources. One possible explanation is the existence of scale economies in the provision of public goods and services. Another possibility is that this effect is due to sluggish adjustment to population changes. That is, when population increases, communities are slow to change their behavior, so per capita magnitudes fall. To examine the second possibility, we estimated a simple stock adjustment version of equation (1.5). This amounts to including the lagged dependent variable ( $DEP_{t-1}$ ) in each of the equations in Table 4.3. These results, which are reported in Table 4.4, suggest that one cannot reject the hypothesis that the coefficient on the lagged dependent variable is zero. Thus, slow adjustment does not appear to be a major factor in our data. Moreover, in each equation inclusion of the lagged dependent variable leaves the other coefficients basically unchanged. While we do not interpret these results as "proof" that past decisions have no effect on current tax and expenditure patterns, they do indicate that allowing for dynamics,

**Table 4.4 Individual Effects Model With Slow Adjustment<sup>a</sup>**

	$\ln T_{Dt} - \ln T_{Dt-1}$	$\ln T_{Nt} - \ln T_{Nt-1}$	$\ln E_t - \ln E_{t-1}$
Intercept	-0.0916 (0.0137)	-0.0420 (0.0571)	-0.0521 (0.0174)
$\ln P_t^i - \ln P_{t-1}^i$	-1.575 (0.504)	-0.442 (2.230)	-1.843 (0.685)
$\ln Y_t - \ln Y_{t-1}$	0.00703 (0.239)	-0.441 (1.052)	0.154 (0.324)
$\ln GRANTS_t - \ln GRANTS_{t-1}$	-0.0233 (0.0635)	0.117 (0.280)	0.0882 (0.0854)
$\ln ASSETS_t - \ln ASSETS_{t-1}$	-0.00731 (0.0121)	-0.000256 (0.0532)	-0.00246 (0.0164)
$\ln DEBT_t - \ln DEBT_{t-1}$	-0.00278 (0.0291)	0.0220 (0.128)	-0.0889 (0.0395)
$SHARE_t - SHARE_{t-1}$	-0.00350 (0.00494)	0.00695 (0.0218)	-0.00654 (0.00671)
$\ln POP_t - \ln POP_{t-1}$	-0.763 (0.159)	-0.791 (0.699)	-0.988 (0.215)
$\ln Y_t^i - \ln Y_{t-1}^i$	-1.261 (0.420)	-1.231 (1.852)	-1.649 (0.570)
$DEP_{t-1}$	0.0862 (0.173)	1.207 (0.954)	0.0349 (0.247)

<sup>a</sup>Estimation is by instrumental variables. Numbers in parentheses are standard errors.  $DEP_{t-1}$  is treated as endogenous and  $DEP_{t-2}$  is included as an instrumental variable.

at least in a simple way, appears to have no impact on our results about the effects of deductibility.<sup>14</sup>

As noted above, the use of equation (1.4) imposes a constraint across equations of our model; namely, that the ratio of the coefficient on the state income variable to the coefficient on the tax price variable should be identical in each of the equations. This ratio is our estimate of  $-\gamma_1$ . Imposing this constraint on the estimated coefficients does not alter any of the qualitative results of the model. A test of the null hypothesis that the data satisfy the constraint yields a statistic of 0.158 which is distributed as a chi square with 2 degrees of freedom. The null hypothesis is not rejected at conventional levels of significance.<sup>15</sup> Further, the estimated value of  $\gamma_1$  is  $-.972$  (with a standard error of  $.286$ ). Thus, as expected, the community tax price falls relative to the state tax price as community income rises relative to state income.<sup>16</sup>

In our next set of experiments, we deleted *ASSETS*, *DEBTS*, and *GRANTS* from the set of right-hand-side variables. As mentioned earlier, although we think that a good case can be made for including these variables, they were omitted from Feldstein and Metcalf's specification, hence, it is interesting to see whether their omission induces any substantive changes. Note that because grants are excluded from consideration, it makes sense for the dependent variable in the "expenditures" equation to be expenditures from own sources only. In terms of our notation, the appropriate variable is  $\ln(T_D + T_N)$  rather than  $\ln E$ .

The results are reported in Table 4.5. A comparison with Table 4.3 indicates that all of the substantive results are basically unchanged. Thus, while we prefer the specification in Table 4.3 on theoretical grounds, use of the Feldstein-Metcalf set-up does not affect our con-

**Table 4.5** Omitting *GRANTS*, *ASSETS* and *DEBTS* from the *X*-Vector<sup>a</sup>

	$\ln T_{Dt} - \ln T_{Dt-1}$	$\ln T_{Nt} - \ln T_{Nt-1}$	$[\ln (T_{Dt} + T_{Nt}) - \ln (T_{Dt-1} + T_{Nt-1})]$
Intercept	-0.0922 (0.0107)	-0.0380 (0.0283)	-0.0912 (0.0140)
$\ln P_t - \ln P_{t-1}$	-1.525 (0.457)	-0.869 (1.210)	-1.724 (0.598)
$\ln Y_t - \ln Y_{t-1}$	-0.0328 (0.224)	-0.548 (0.592)	-0.706 (0.292)
$SHARE_t - SHARE_{t-1}$	-0.00298 (0.00469)	0.00740 (0.0124)	0.00384 (0.00614)
$POP_t - POP_{t-1}$	-0.746 (0.151)	-0.785 (0.401)	-0.916 (0.198)
$Y_t^* - Y_{t-1}^*$	-1.218 (0.401)	-1.142 (1.062)	-0.583 (0.524)

<sup>a</sup>Estimation is by instrumental variables. Numbers in parentheses are standard errors.

clusions. In particular, we still find no evidence that a higher tax price leads to greater reliance on nondeductible sources of revenue.

Our last set of results consists of the basic specification estimated for individual cross sections. As emphasized above, we think the individual effects model is more suitable. It is therefore of some interest to see how the results would have differed if we had used a cross section instead.

The cross-sectional results for 1980 are reported in Table 4.6. From the first column, we see that contrary to what one would expect, increases in the tax price *increase* the reliance on deductible sources of revenue. However, this coefficient is imprecisely estimated. Moreover, from the second column, increases in the tax price decrease reliance on nondeductible revenue sources by a huge amount (the elasticity is minus 15), and this coefficient is more than twice its standard error.

What accounts for these peculiar results? One possibility is that the year 1980 was atypical for the communities in our sample. We therefore estimated the cross-sectional equations for the years 1978 and 1979 as well. The results are reported in the top portion of Table 4.7. (To conserve space, we report only the coefficients on the tax price and income coefficients.) A glance at the figures in Tables 4.6 and 4.7 suggests that the point estimates vary considerably from year to year. Indeed, the elasticities of  $E$  with respect to  $P^s$  flip signs from year to year.

Thus, we cannot “blame” the implausible results of Table 4.6 on the choice of year. An alternative possibility is that the cross-sectional equations are estimated with inappropriate instruments. The estimates presented so far use lagged tax price as an instrument. If: (a) the primary source of endogeneity in the cross section arises from the fact that unobserved tastes for spending induce correlation between  $P_{it}$  and the error term, and (b) these unobserved taste differences persist over time; then lagged price will do little to purge the correlation between  $P_{it}$  and the error term.

Fortunately, for the year 1980 we have available an alternative set of instrumental variables suggested by Feldstein and Metcalf. These are (1) the proportion of taxpayers in the state who would be expected to itemize if each taxpayer’s probability of itemizing were equal to the national average for his or her adjusted gross income class; (2) the marginal tax rate on the *first* dollar of state and local tax deductions; and (3) the average tax rate on state and local tax deductions. These variables are expected to be correlated with the state tax price, but uncorrelated with the error term in the regression. (See Feldstein and Metcalf [1986] for further details.) The estimates that are obtained with this alternative set of instrumental variables are reported at the bottom of Table 4.7. A comparison of those elasticities with those reported in



Table 4.6 Cross-Sectional Results for 1980<sup>a</sup>

	(1) $\ln T_D$	(2) $\ln T_N$	(3) $\ln E$
Intercept	-14.88 (10.68)	65.06 (21.50)	26.16 (7.329)
$\ln P^s$	0.451 (3.786)	-15.16 (7.62)	0.451 (2.598)
$\ln Y$	1.631 (1.294)	-6.011 (2.604)	-2.314 (0.888)
$\ln GRANTS$	0.0487 (0.0880)	-0.0141 (0.177)	0.317 (0.0604)
$\ln ASSETS$	-0.0420 (0.0342)	0.303 (0.0689)	0.0895 (0.0235)
$\ln DEBT$	0.0974 (0.0582)	0.419 (0.117)	0.164 (0.0400)
$\ln PUPILS$	0.199 (0.279)	0.286 (0.562)	0.0942 (0.192)
<i>SHARE</i>	0.0164 (0.00623)	-0.0391 (0.0125)	-0.0150 (0.00427)
<i>NONWHITE</i>	0.114 (0.309)	-0.477 (0.622)	-0.289 (0.212)
<i>POOR</i>	-5.586 (1.314)	5.778 (2.646)	1.101 (0.902)
<i>OLD</i>	3.932 (1.610)	0.615 (3.242)	0.966 (1.105)
<i>OWN</i>	-1.316 (0.317)	0.841 (0.638)	0.0338 (0.217)
<i>PCT810</i>	0.0336 (0.0806)	-0.212 (0.162)	-0.0372 (0.0553)
<i>PCT1015</i>	0.0479 (0.0348)	0.0678 (0.0701)	0.00855 (0.0239)
<i>PCT1525</i>	-0.0228 (0.0225)	0.0322 (0.0452)	0.0107 (0.0154)
<i>PCT25</i>	-0.0112 (0.0300)	0.112 (0.0605)	0.0477 (0.0206)
$\ln POP$	0.114 (0.0382)	-0.126 (0.0770)	-0.0556 (0.0262)
$\ln Y^s$	1.948 (0.638)	-5.002 (1.284)	-0.518 (0.438)

<sup>a</sup>Estimation is by instrumental variables. Numbers in parentheses are standard errors.

Table 4.6 indicates that the “wrong” signs are still present. We conclude that the use of single cross sections to estimate the fiscal response of communities to changes in their economic environments can produce quite misleading results.

Nevertheless, we think that cross-sectional data may help shed some light on a measurement problem that was discussed above. Namely,

**Table 4.7** Additional Cross-Sectional Results

	(1) $\ln T_D$	(2) $\ln T_N$	(3) $\ln E$
1978			
$\ln P^a$	-11.76 (4.452)	-0.0334 (7.817)	-4.138 2.655
$\ln Y$	2.172 (1.851)	-5.707 (3.251)	0.198 (0.104)
1979			
$\ln P^a$	3.053 (3.660)	-21.90 (7.530)	-4.393 (2.678)
$\ln Y$	1.491 (1.541)	-5.550 (3.172)	-1.105 (1.128)
1980 <sup>a</sup>			
$\ln P^a$	7.898 (3.356)	-8.750 (6.217)	3.289 (2.140)
$\ln Y$	1.192 (1.361)	-6.764 (2.520)	-2.691 (0.867)

*Note:* Estimation is by instrumental variables. Numbers in parentheses are standard errors.

<sup>a</sup>Feldstein and Metcalf's instruments.

our property tax data include payments from both residential and non-residential sources, which in theory can bias toward zero the tax price coefficients in the  $T_D$  and  $T_N$  equations. For a subset of our communities, we obtained 1980 data on the proportion of the property tax base that was residential. (Such data were not available for other years). Assuming that residents paid property taxes in proportion to their share in the tax base, we were able to estimate residential and nonresidential property taxes paid. For this subsample, the cross-sectional equations for  $T_N$  and  $T_D$  were then estimated both with and without nonresidential property taxes included in the respective left-hand-side variables. The results with and without the adjustment were essentially the same for both the  $T_D$  and  $T_N$  equations. This suggests that in our sample, the share of nonresidential property taxes is sufficiently small that only an inconsequential bias is induced by lumping residential and nonresidential property taxes together. Of course, we recognize the tenuous nature of this exercise. It is no substitute for an analysis of longitudinal data with information on the mix of property tax receipts.

#### 4.5 Conclusion

We have examined fiscal data on 172 communities over the period 1978 to 1980 in order to estimate the effects of deductibility on local taxing and spending behavior. From a methodological point of view,

our first main result is that local data provide a fruitful source of information on the impact of deductibility on fiscal decisions. Difficulties in defining tax prices and accounting for differences in institutional structures across states do not seem to prevent us from obtaining sensible and useful results. The second methodological result is that parameters estimated from a single cross section of fiscal data must be interpreted with care. Such parameters may depend upon the particular year chosen, and may be inconsistent because of the failure to account for individual effects.

Our main substantive findings are:

1. Deductibility does affect the choice of revenue sources. The elasticity of deductible taxes with respect to the tax price is in the range  $-1.2$  to  $-1.6$ . In our sample, the mean value of the logarithm of the tax price in 1980 was  $-0.110$ . Thus, if deductibility were removed, i.e., if  $\ln P$  became zero, then collections of deductible taxes would fall by more than 13 percent.

2. However, we have not been able to find any evidence that removing deductibility would increase reliance on nondeductible sources of finance. Indeed, the point estimates of these elasticities are negative, although they are imprecisely estimated. Thus, there is no reason to think that tax substitutions at the local level would mitigate against increased federal tax revenues if deductibility were removed.

3. Local spending is quite responsive to changes in the tax price, with an elasticity of about  $-1.8$ . Thus, removing deductibility could have major effects on local spending.

## Notes

1. See U.S. Department of the Treasury (1984) and *President's Tax Proposals to the Congress for Fairness, Growth, and Simplicity* (1985).

2. There are also claims that removing deductibility would lead to an unfair increase in the tax burden on middle class taxpayers. The distributional implications of deductibility, both across states and across income classes, are discussed in Feenberg and Rosen (1986) and Kenyon (1986).

3. "What Happens if Washington Changes the Rules?" *New York Times*, 23 June 1985, E5.

4. As Fisher (1986) has noted, another factor that might affect the tax price is the fact that some state income taxes allow credits and deductions for local property tax payments. To examine this possibility, we computed the state income tax liability of a household that had the average taxable income on all itemized returns in its state. In every case, if this household paid the average property tax in its community, then the credit or deduction had no *marginal* effect on the tax price of local spending. This is because the credits and de-

ductions are capped at a sufficiently low level that the household with the average property tax is not affected on the margin.

5. Note that equation (1.1) ignores differences in the (quality-adjusted) resource cost of public sector inputs across communities. Implicitly, this assumes a national market for such inputs. Alternatively, input costs may vary across communities, but if they do not change over time, they are included in the individual effect. Holtz-Eakin (1986) tests for the presence of individual effects in these data and finds that they are present. In addition, this specification does not allow for year effects. In some preliminary experiments we included year effects, and found that they did not change any of the substantive results.

6. Inman (1985) provides an interesting attempt along these lines.

7. Hettich and Winer (1984) employ state data without including figures from localities in the totals.

8. A more complete description of the data set from which this sample is drawn is contained in Holtz-Eakin, Newey, and Rosen (1985).

9. To remain in the sample, communities had to report positive school expenditures.

10. The econometric results below are unchanged when income and sales taxes are excluded in the computation of deductible taxes.

11. This procedure differs substantially from that used by Feldstein and Metcalf, who took advantage of data from individual tax returns. Nevertheless, the two methods yield quite similar results. In 1980, Feldstein and Metcalf calculate the mean tax price as 0.92 with a standard deviation of 0.02; the range is from 0.87 to 0.96. In comparison, our statewide tax prices for 1980 have an average value of 0.90, a standard deviation of 0.03, a minimum of 0.86, and a maximum of 0.94.

12. Allowing for income and sales taxes would introduce some nonlinearity into the problem, but not change the qualitative results.

13. Of course, a general analysis of the bias requires consideration of the complete set of covariances among the right-side variables and the vector of covariances between each of these variables and  $\psi_{it}$ . We think that in this particular case, these other covariances are unlikely to change our conclusion.

14. Holtz-Eakin, Newey, and Rosen (1985) discuss dynamic aspects of local government taxing and spending behavior.

15. The test is computed by estimating the three equations as a system using three-stage least squares both with and without imposing the constraint. The covariance matrix from the unconstrained estimation is used in both cases. The test statistic is the difference between the constrained and unconstrained weighted sum of squared errors for the system.

16. With an estimate of  $\gamma_1$ , one can use equation (1.5) to work backward coefficients on  $\ln(P_{it}^y - \ln P_{it-1}^y)$  and  $(\ln Y_{it} - \ln Y_{it-1})$  to solve for  $\alpha_2$ , the effect of community income on the left-hand-side variable. In the expenditures equation, this turns out to be negative, a result counter to a number of previous studies. However, the estimate is statistically insignificant. We conjecture that mismeasurement of the income variable may be the cause of this result.

## References

- Eisner, R., and J. Pieper. 1984. A new view of the federal debt and budget deficits. *American Economic Review* 74: unpublished appendix.

- Executive Office of the President, Office of Management and Budget. 1986. *Special analyses, budget of the United States government fiscal year 1987*. Washington, D.C.: U.S. Government Printing Office.
- Feenberg, Daniel R., and Harvey S. Rosen. 1986. The deductibility of state and local taxes: Impact effects on state and income class. *Growth and Change*: 11–31.
- Feldstein, Martin, and Gilbert Metcalf. 1986. The effect of federal tax deductibility on state and local taxes and spending. Boston: Working Paper no. 1791, National Bureau of Economic Research.
- Fisher, Ronald C. 1986. Intergovernmental tax incentives and local fiscal behavior. East Lansing: Michigan State University, mimeo.
- Hettich, Walter, and Stanley Winer. 1984. A positive model of tax structure. *Journal of Public Economics* 24: 67–87.
- Holtz-Eakin, D. 1986. Unobserved tastes and the determination of municipal services. *National Tax Journal* V. 39: 527–532.
- Holtz-Eakin, D., W. Newey, and H. S. Rosen. 1985. Implementing causality tests with panel data, with an example from local public finance. Boston: National Bureau of Economic Research, Technical Working Paper no. 48.
- Inman, Robert P. 1979. The fiscal performance of local governments: An interpretive review. In *Current Issues in Urban Economics*, ed. P. Mieszkowski and M. Straszheim, 270–321. Baltimore: Johns Hopkins University Press.
- . 1985. Does deductibility influence local taxation? University of Pennsylvania. Mimeo.
- . Forthcoming. Markets, government, and the “new” political economy. In *Handbook of Public Economics*, ed. Alan J. Auerbach and Martin Feldstein. Amsterdam: North-Holland Press.
- Kenyon, Daphne A. Forthcoming. Implicit aid to state and local governments through federal tax deductibility. In *Intergovernmental Fiscal Relations in an Era of New Federalism*, ed. M. Bell. Greenwich, Conn.: JAI Press.
- Noto, Nonna, and Dennis Zimmerman. 1984. Limiting state-local tax deductibility: Effects among the states. *National Tax Journal* 37: 539–50.
- Oates, Wallace E. 1975. “Automatic” increases in tax revenues. The effect on the size of the public budget. In *Financing the New Federalism*, ed. Wallace E. Oates. Baltimore: Johns Hopkins University Press: 139–60.
- President's Tax Proposals to the Congress for Fairness, Growth, and Simplicity*. Office of the President 1985. Washington, D.C.: U.S. Government Printing Office.
- Sales and Marketing Management Magazine. Survey of Buying Power*. New York: Bill Publications. Various years.
- U.S. Bureau of the Census. 1972. *Census of governments*. Washington, D.C.: U.S. Government Printing Office.
- . 1977. *Census of governments*. Washington, D.C.: U.S. Government Printing Office.
- . 1983. *County and city data book*. Washington, D.C.: U.S. Government Printing Office.
- . *Annual survey of governments*. Washington, D.C.: U.S. Government Printing Office. Various years.
- U.S. Department of the Treasury. 1984. *Tax reform for fairness, simplicity, and economic growth*. Vol. 2.
- White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48: 817–38.
- . 1982. Instrumental variables regression with independent observations. *Econometrica* 50: 483–500.

## Comment      Ronald C. Fisher

Although economists have carefully examined, during the past 25 years, the effects of intergovernmental grant incentives on state and local government fiscal behavior, the effects of intergovernmental tax incentives on both the amount of spending and the choice of the revenue structure were largely ignored until very recently. [Notable exceptions are Inman (1971) and McLure (1967).] In the past four years, however, a substantial number of both theoretical and empirical papers have appeared which explicitly consider the effect of tax incentives provided by the national and state governments on the expenditure and revenue decisions of all subnational governments. Indeed, this conference is evidence of that trend as four of the eight papers presented deal directly with the effects of intergovernmental tax incentives.

Although this change perhaps reflects an increased awareness of and interest in the economics of the subnational government sector, the fact remains that the primary motivating factor for the new interest in tax incentives was a national government policy issue, reform of the federal individual income tax and the appropriate treatment of the deduction for state and local taxes. Tax incentives are largely unimportant for national government taxes (although federal income taxes are deductible against state income taxes in 16 states), and the overwhelming dominance of income taxes at the national level effectively reduces interest in questions about the choice among alternative revenue instruments. Even the voluminous intergovernmental grant literature, while providing insight to the fiscal behavior of subnational governments, has often been focused on the appropriate structure of grants from the viewpoint of the national government.

Despite the origins of these new research interests, the inevitable result is likely to be increased attention to the fiscal policy of subnational governments for its own sake and not just as it relates to national economic policy decisions. This is an important change in direction for both practical and academic reasons. Subnational government expenditures from own-sources in the United States account for more than 10 percent of gross national product. And the substantial economic and fiscal diversity among subnational governments simply provides an opportunity for examining issues of economic behavior which cannot be considered by focusing on the national government (except through international comparisons, where the institutional and data problems are even more severe than in the world of state and local governments). For instance, the diversification of state and local government revenues

among alternative sources is largely the factor that makes analysis of tax incentives both interesting and possible.

### Recent Analyses of Tax Incentives

A common issue in the intergovernmental grant literature is the influence of grants, through income and price effects, on the level of recipient subnational government spending in the aggregate and for specific functions. In a few cases, consideration is also given to the influence of grants on the revenue structure of the recipient governments, such as the incentive in the U.S. general revenue-sharing formula for tax as opposed to user-charge financing, and for state income taxes in particular. Tax incentives, including federal income tax deductions for subnational taxes as well as state income tax deductions and credits for local government taxes, were first incorporated into the grant models as an additional factor affecting the tax price for subnational government services. The issue is whether tax incentives influence the level and type of government spending. But because these tax incentives are often not neutral among alternative revenue sources, the most recent research considers the effect of the incentives on the mix, as well as level, of subnational government taxes.

This recent research includes work by Hettich and Winer (1984), Kenyon (forthcoming), and Gade (1987) examining the revenue decisions of state governments; a paper by Feldstein and Metcalf (1986) which considers the revenue decisions of state and local governments combined; and work by Inman (1979 and 1985), Gramlich (1985), Bell and Bowman (1987) and Fisher (1986) about the influence of tax incentives on the fiscal decisions of individual local governments.

The paper by Holtz-Eakin and Rosen fits in this last group. They provide a careful examination of the effect of federal income tax deductibility on the amount of spending and the use of deductible as opposed to nondeductible revenue sources to finance that spending for a set of municipal governments. Holtz-Eakin and Rosen's conclusions—that deductible taxes and expenditures are increased by federal tax deductibility—are generally consistent with the results of the other studies of local fiscal decisions, particularly considering the degree of disaggregation of the revenue options. What particularly distinguishes the Holtz-Eakin and Rosen work, however, is the clever, and apparently important, advances in the method for estimating tax price elasticities.

There are at least two major innovations in this work by Holtz-Eakin and Rosen compared to these other papers. First, by using panel data for 172 municipal governments over the years 1975 to 1980, they estimate the effects of deductibility with difference equations, effectively comparing changes in revenue amounts to the change in tax prices

caused by deductibility. This method corrects for unobservable community-specific factors that can influence these decisions and that apparently can be important, as Holtz-Eakin argues elsewhere (*National Tax Journal*, 1986). They also demonstrate that estimation using first-differences can give substantially different results than estimation from cross-sectional analysis using the same data.

Second, because tax prices net of federal deductions cannot be measured directly for these municipalities, Holtz-Eakin and Rosen estimate those local tax prices based on the weighted-average marginal tax price for the *state* in which the city is located adjusted for the difference between the per capita income in the locality and the state. The presumption is that as the income of a locality rises above that of the state, the tax price falls below that for the state. Taking first differences, this is represented by their equation (4).

$$\ln P_{it} - \ln P_{it-1} = (\ln P_{it}^s - \ln P_{it-1}^s) + \gamma_1 \times [(\ln Y_{it} - \ln Y_{it-1}) - (\ln Y_{it-1}^s - \ln Y_{it-1}^s)],$$

where  $P$  is price,  $Y$  is per capita income,  $i$  represents the municipality,  $s$  represents municipality  $i$ 's state, and  $t$  is year. If there are other variables which influence tax prices, the assumption is that the difference between the state and local values is stable over time (and thus eliminated by the differencing).

Holtz-Eakin and Rosen estimate first differences of constant elasticity equations for per capita deductible taxes (property, income, sales), nondeductible taxes, and expenditures as a function of tax price (measured as above), per capita family income, grants, the state government share of spending, per capita assets, per capita debt outstanding, and population. They report that per capita deductible taxes and expenditures of these municipalities are significantly negatively related to tax prices, but that there appears to be no substitutability between deductible and nondeductible taxes. These results are generally consistent with those in the other papers examining local governments, with the exception of Inman's 1985 paper.

#### Evaluation of the Holtz-Eakin and Rosen Approach

My comments about the approach taken by Holtz-Eakin and Rosen fall into two groups, those concerning the approximation of tax burden prices for localities based on the corresponding state tax price and those about the overall structure of the model.

#### *Local Tax Burden Prices*

*Measuring Local Tax Burden Prices by State Tax Prices.* Theoretically, Holtz-Eakin and Rosen's assertion that differences between the state



and local tax prices net of deductibility depend on the differences between the community's values for a vector of variables and their state counterparts seems clear. But as implemented, the assumption is that changes in local tax prices over time relative to changes in the state prices can be reflected solely by changes in the difference between local and state per capita incomes. And that assumption is based on the notion that there is a significant relationship between the difference between state and local tax prices and the difference between state and local per capita incomes in any one year. The tax price net of deductibility depends both on taxpayers' federal marginal tax rates and on the fraction of taxpayers who itemize federal deductions. There is evidence suggesting that the correlation between income and itemizing at a given time is tenuous.

In a survey of research on tax incentives, Kenyon (forthcoming, 29) notes that among states with effectively identical per capita incomes, there can be wide differences in the percentage of taxpayers who itemize federal income tax deductions. The survey data reported and used by Gramlich (1985) suggest that even among localities in the same state, the probability of itemizing is not explained well by income alone. The average family income and percentage of voters who itemize for various sets of localities in Michigan in the Gramlich study are shown in table C4.1. Comparing both the city of Detroit to the city of Lansing and the Detroit suburbs to the Lansing suburbs, the percentage of itemizing voters is substantially greater for the Detroit area despite the fact that average family incomes are higher in the Lansing area. One likely explanation for the difference between those areas is that renting rather than owning housing is relatively more common in the Lansing area than in the Detroit area. The opposite pattern, the one hypothesized by Holtz-Eakin and Rosen, applies however for the "rural" and "other urban" counties.

**Table C4.1**                    **Itemizing Behavior and Community Income in Michigan: Results From Gramlich, 1985**

Jurisdiction	Average Family Income	Percentage of Voters Who Itemize Deductions
Detroit	\$12,556	39.6
Lansing	15,371	35.7
Rural counties	16,292	43.4
Other urban counties	17,221	50.8
Total sample	17,544	49.0
Detroit Suburbs	21,574	62.0
Lansing Suburbs	22,078	50.0

Source: Gramlich, 1985, Table 1, p. 454, and Table 4, p. 459.

But because Holtz-Eakin and Rosen use first differences, if the factors other than income which influence itemizing and tax prices (such as housing type) are relatively stable over time, then changes in local tax prices relative to the state may be captured entirely by changes in local income relative to the state. Holtz-Eakin and Rosen do assume that those other factors, the  $Z_{it}$ 's in their notation, are stable. But in estimating the tax and expenditure functions, the authors assume that there are economic and demographic variables affecting the budget constraint and/or preferences, the  $X_{it}$ 's, which are changing. There is something of an internal inconsistency here if one expects that some of the factors affecting the level of taxes and expenditures also influence the difference between state and local tax prices. In addition, the income data used are hedonic estimates based on changes in some characteristics of the community. Without changes in those characteristics over time, there can be no income changes over time.

How well their method works is an empirical question and a difficult one to test because of the absence of local tax prices to begin with. One possibility is to evaluate how well the method works for estimating *state* tax prices by using the national average tax price and changes in the difference between state and national per capita incomes. Because I did not have average marginal federal income tax rates by state available, I estimated Holtz-Eakin and Rosen's equation (4) using the percentage of taxpayers who itemize returns for 1983 and 1984 in each state and nationally as the measure of tax price. The result is shown below:

$$\begin{aligned} \ln I_{i84} - \ln I_{i83} &= 1.3092 (\ln I_{N84} - \ln I_{N83}) + \\ &\quad (.4637) \\ &- 1.0576 [(\ln Y_{i84} - \ln Y_{N84}) - (\ln Y_{i83} - \ln Y_{N83})] \\ &\quad (.4928) \end{aligned}$$

$$R^2 = .0875, F = 4.61$$

where  $I_i$  = percentage of itemizers in state  $i$  or nationally,

$Y_i$  = per capita income in state  $i$  or nationally.

This estimating equation for state tax prices based on the national average price behaves quite differently than Holtz-Eakin and Rosen hypothesize for local prices based on the state average. If the difference between state and national per capita income decreases over the period, itemizing in that state *decreases* (and thus the tax price increases); itemizing in a state apparently goes down as income goes up. Although this result suggests caution about Holtz-Eakin and Rosen's approach, there are at least two reasons why the results for the local estimates may be different from these results for state itemizing. First, the state results for *tax price* may differ from those for *itemizing*; it seems clear

that marginal rates will rise (and tax prices fall) as income rises. Second, states are such large and diverse areas that the assumption of no change in other factors influencing tax prices over the period may be less accurate for states than localities.

*State Property Tax Incentives.* A second concern about the measurement of local tax prices arises for two related reasons. Holtz-Eakin and Rosen consider only the incentive created by federal deductibility, ignoring state tax incentives from deductions, credits, and grants, and as a result they lump together all the deductible taxes on property, income, and sales. My sense is that for many local governments the potential revenue tradeoff among these three taxes is both more significant and likely than a tradeoff between these taxes as a group and other revenues (nondeductible taxes and charges). But obviously, substitution between property taxes on the one hand and a local income or sales tax on the other cannot be considered in this framework. It does not seem surprising that Holtz-Eakin and Rosen find no effect of tax prices on use of nondeductible revenues, which are mostly user charges. Because of the administrative costs of establishing and operating a user fee system, marginal adjustments of user charge reliance are unlikely—either user charges are used to cover a substantial portion of costs or they are not.

The difficulty from grouping property taxes with income and sales taxes is intensified by the fact that specific state government incentives influencing property taxes are common. Taxpayers in 33 states are allowed an itemized deduction against state income tax for local property taxes, and state government credits for local property taxes are provided in 32 states, with both incentives used to some degree in 21 states. Both of these state tax incentives reduce the marginal price of local property taxes. In addition, Holtz-Eakin and Rosen apparently (see their footnote 8) restricted their sample to cities with responsibility for local education expenditures. In many states, the state aid formula for education includes either the property tax rate for education or per pupil property tax revenue. Such a grant formula also reduces the relative tax price for property taxes.

The available evidence from other studies suggests both that local governments do respond significantly to these state property tax incentives and that localities may respond to all tax incentives differently for property, income, and sales taxes. Property tax responses to state government property tax credits are examined by Bell and Bowman (1987) for Minnesota cities, and Fisher (1986) for Michigan local governments. Both report statistically significant increases in property taxes as a result of the credits, although the magnitude of the increase is somewhat smaller than the effect estimated by Holtz-Eakin and Rosen.

Inman's (1985) study of the revenue and expenditure choices of 41 large cities is perhaps most comparable to the work by Holtz-Eakin and Rosen. Inman tried to include influences of both federal deductibility and state incentives in the tax price measures, however, and estimated separate equations for the different taxes. And his results certainly showed differences in the price elasticities for the major taxes—the own-price elasticities for property and general sales taxes were statistically significant and *positive* while the price elasticity for income taxes took the usual negative sign. These counterintuitive results prompted an energetic, if not convincing, supply-side explanation. Inman also found different responses to different components of the tax prices for any given tax. These results (counterintuitive ones and all) certainly suggest that local government substitution among deductible taxes needs to be considered, and that the possibility of local governments responding differently to federal deductibility and state tax incentives might also warrant examination.

It seems to me that there are at least two possibilities for estimating separate burden prices for property taxes and other deductible taxes so that Holtz-Eakin and Rosen's method can be applied to these questions of allocation among deductible taxes. First, data about use of state tax incentives in various localities are sometimes available from the state governments, from which more detailed burden prices can be computed. Second, state income tax simulation models, such as those developed and used by Feenberg and Rosen (1985), may be able to be used to calculate the effects of state income tax deductions and credits on marginal property tax prices either for taxpayers at selected income levels or perhaps for all state taxpayers on average. Although Holtz-Eakin and Rosen note that these credits and deductions have no marginal effect for average income taxpayers with average property taxes in their sample, that is not parallel to how tax prices net of deductibility were computed. In the latter case, the price is the average of prices for itemizers and nonitemizers rather than the effect of deductibility for an average income taxpayer.

### *Modeling Local Government Fiscal Decision Making*

*Voter or Bureaucratic Choice?* One important theoretical issue for all studies of government fiscal choice is whether that choice arises directly from voting or as a result of some bureaucratic decision. This distinction is common in the intergovernmental grant literature; using Inman's terminology, the usual choice is between the median voter and dominant party models. In the voting models, an individual voter with specific characteristics is decisive, and that voter's characteristics are used to estimate the demand function for the government. In the bureaucratic models, an official makes choices taking into account the preferences

of the entire community, with an average of community characteristics usually used to estimate the expenditure or tax equations.

Among the recent studies of the effect of tax incentives on expenditure and tax structure choice, only Gramlich (1985) explicitly adopts the voting approach, specifically the median voter model. All of the others, including Holtz-Eakin and Rosen, implicitly or explicitly use bureaucratic models and, therefore, measure the tax prices as a weighted average of the marginal prices for individuals or groups of individuals in the community. But these average marginal burden prices suggest a smoothness in the tax price distribution that generally simply does not exist. Holtz-Eakin and Rosen note this issue briefly early in their paper, but they reject the median voter alternative as having even greater problems.

This issue deserves careful consideration. In the simple case where federal tax deductibility is the only tax incentive, taxpayers obviously fall into one of two groups, those who itemize and those who do not. If there is a state tax credit in addition to federal deductibility, there are four major groups of taxpayers—those who take the federal deduction only (and are not eligible for the credit); those who receive the state credit but do not itemize for federal taxes (perhaps because they have no mortgage interest to deduct or because they are renters); those taxpayers who itemize and receive the state credit; and those who can take advantage of neither option. The implication is that there may be significant discontinuities in the distribution of tax prices among taxpayers in a given community. Can such an environment be adequately represented by an average of those prices?

In a voting model, tax incentives will influence the community choice only if the decisive voter's tax price is reduced by the incentives or if the identity of the decisive voter is changed by the tax incentives. In many cities, a majority of taxpayers obviously do not itemize federal deductions; indeed, median income taxpayers do not itemize in many cities. These observations are at least part of the reason why Gramlich finds smaller effects on local government expenditures from changes in deductibility than in many other studies. Indeed, Gramlich finds no expenditure effect from changes in deductibility in the two large and relatively lower income central cities in his sample, Detroit and Lansing. This stands in contrast to the relatively large expenditure effects reported by Holtz-Eakin and Rosen [even after allowing for the difference in tax price elasticities measured for an individual as opposed to all individuals, as discussed by Feldstein and Metcalf (1986)].

*Alternative Responses to Tax Incentives.* Of course, changes in deductibility or other tax incentives may cause changes in tax structure even if there are no changes in desired or selected expenditures or in

the mix of revenue sources used. By altering their tax structures, state or local governments may attempt to offset the distributional changes caused by the change in tax incentives.

As Gramlich and others have pointed out, the main effect of altering deductibility is to change the distribution of the tax burden toward those who gain most from deductibility. Because elimination of deductibility is expected to increase the progressivity of subnational government taxes, states and localities may respond not only by changing the level of spending or the mix of revenue sources, but also by changing the type of services provided or the distribution (progressivity) of their tax burden. The last response need not require changes in the mix of taxes which is used, but simply changes in tax structure. For instance, state governments might adopt a less graduated income tax rate structure or alter the sales tax base, while local governments might change assessment practices or adopt property tax credits or exemptions. I am a bit skeptical that an average tax price can adequately reflect those potential distributional effects. Median voter models may be no better, however, because the distributional changes occur even if the median voter's tax price is unaffected by deductibility.

## References

- Bell, Michael, and John Bowman. The effect of various intergovernmental aid types on local own-source revenues: The case of property taxes in Minnesota cities. *Public Finance Quarterly* 15, 3: 2–97.
- Feenberg, Daniel R., and Harvey S. Rosen. 1985. State personal income and sales taxes: 1977–1983. Working Paper no. 1631. Cambridge, Mass.: National Bureau of Economic Research.
- Feldstein, Martin, and Gilbert Metcalf. 1986. The effect of federal tax deductibility on state and local taxes and spending. Working Paper no. 1791. Cambridge, Mass.: National Bureau of Economic Research.
- Fisher, Ronald C. 1986. Intergovernmental tax incentives and local fiscal behavior. Michigan State University. Mimeo.
- Gade, Mary. 1987. Optimal state tax design. Oklahoma State University. Mimeo.
- Gramlich, Edward M. 1985. The deductibility of state and local taxes. *National Tax Journal* 38, no. 4:447–65.
- Hettich, Walter, and Stanley Winer. 1984. A positive model of tax structure. *Journal of Public Economics* 24, 67–87.
- Holtz-Eakin, Douglas. 1986. Unobserved tastes and the determination of municipal services. *National Tax Journal* 39: 527–32.
- Inman, Robert P. 1971. Towards an econometric model of local budgeting. In *Proceedings of the Sixty-Fourth Annual Conference on Taxation*, 699–719. National Tax Association. Columbus, Ohio.
- . 1979. Subsidies, regulations, and the taxation of property in large U.S. cities. *National Tax Journal*, Supplement, 32, no. 2: 159–68.
- . 1985. Does deductibility influence local taxation? Working Paper no. 85-6, Federal Reserve Bank of Philadelphia.

- Kenyon, Daphne. (Forthcoming). Implicit aid to state and local governments through federal tax deductibility. In *Intergovernmental Fiscal Relations in an Era of New Federalism*, ed. M. Bell. JAI Press.
- McLure, Charles E., Jr. 1967. The interstate exporting of state and local taxes. *National Tax Journal* 20, no. 1: 49–77.
- U.S. Department of the Treasury. Internal Revenue Service. 1985. *Statistics of Income Bulletin*. Washington, D.C.: U.S. Government Printing Office.
- . 1986. *Statistics of Income Bulletin*. Washington, D.C.: U.S. Government Printing Office.